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ALASKA
REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH, DEC. 1982, Vol. XIX, No. 4

Reflections on the End of the OPEC Era

This paper is intended to put the OPEC oil-price rises of the 1970s and the more recent oil-price decline into historical perspective. Alaskans can then weigh the chance that energy prices will resume their upward climb, giving new momentum to economic growth in the state, against the prospect that the OPEC era is indeed over—meaning that Alaska, along with other energy-exporting regions, must accept a radical and mostly downward adjustment in its development expectations.

Oil Prices and Alaska's Economy

Alaska's labor force, population, and personal income have been increasing faster than those of any other state for almost a decade. Very little of this growth would have happened without the two great surges in world oil prices that most people identify with the rise of OPEC—the Organization of Petroleum Exporting Countries.

The fivefold price increase for Middle Eastern crude oil in 1973-74 and the resulting threefold increase in the market value of U.S. domestic crude oil made it economically feasible to develop the Prudhoe Bay field and complete the Trans-Alaska oil pipeline (TAPS). Even if real oil prices had remained at their 1975-78 levels, Prudhoe Bay oil royalties and taxes would have made Alaska the richest state government *per capita* throughout the 1980s, and the spending and respending of these revenues in Alaska would have combined with continuing private investment in energy resources to put Alaska among the faster-growing states in income and employment.

World oil prices took off once more in 1979-80, however. Real prices at the Persian Gulf "only" tripled this time, but the stability of transportation charges between the North Slope and Lower-48 refineries caused the price of Prudhoe Bay oil—and consequently Alaska's royalty and severance-tax collections—to grow almost five-fold. At their peak in 1981, oil revenues were flowing into the state treasury at an annual rate of more than $10,000 per capita. The effect of this bonanza on state spending for government operations, transfer payments, loan programs, and public works was as awesome as it was predictable. In 1980 the Legislature abolished personal income taxes, and in 1982 it voted to distribute a "Permanent Fund dividend" check of $1,000 to each resident.

By the second quarter of 1981, when crude-oil prices began their present downward trend, most private and governmental planning in the state had come to reflect the assumption that oil prices, and with them the prices of other fossil fuels, would keep rising without limit. Disagreement about the long-term oil price outlook was largely confined to the question of whether price increases would average 2, 3, or 5 percent in excess of general inflation.

The prospect of ever-rising oil prices implied that Prudhoe Bay would generate more and more revenue for the state, and that the spending and respending of that revenue would provide more and more public- and private-sector jobs. It also promised to sustain a high level of exploration activity on state lands and the federal outer continental shelf (OCS) and, most likely, a series of major new discoveries. Rising oil prices convinced sponsors of the proposed Alaska gas pipeline that they could just about ignore the difficulty of marketing North Slope gas as a constraint on the project's economic feasibility.

An ever-increasing real price of oil on world markets also seemed to assure Alaska a petrochem-

This report was adapted from the appendix of a larger study entitled "Alaska Energy Planning Studies," performed by Arlon R. Tussing and Gregg K. Erickson for the Division of Policy Development and Planning, Office of the Governor, October 1982.

ALASKA REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

VOL. XIX, No. 4, December 1982

Published by

Institute of Social and Economic Research
University of Alaska
Anchorage • Fairbanks • Juneau

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Anchorage, Alaska 99501

FEATURE

Arlon R. Tussing — Reflections on the End of the OPEC Era

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icals boom based on the growing cost advantage North Slope natural-gas liquids (NGLs) would have over oil-based petrochemical feedstocks used elsewhere; it also seemed to guarantee development of Alaska's coal for export. Higher and higher prices for oil meant, moreover, that natural gas and coal would be too valuable to use for generating electric power in Alaska; this outlook has been the main rationale for planning a multi-billion dollar hydroelectric generating plant on the Susitna River and has led many legislators to believe that the state would be able to finance the Susitna project with a direct appropriation from the General Fund.

The price of oil is thus the biggest single outside influence on Alaska's economy, and in 1982, uncertainty about the oil-price outlook has become the biggest single source of uncertainty about the state's economic future. The possibility that the oil-price boom may be over has profound consequences which thus far have been easier to ignore in Alaska than in other energy-exporting areas.

Since the upward movement of oil prices ended in 1981, economic distress has already overtaken many of the top oil-exporting countries. By the end of 1982, all but two OPEC nations are likely to be in a deficit fiscal and foreign-exchange position. In less than a year, a record boom has given way to a grave depression in the deep-gas areas of Oklahoma, among oilfield-service contractors, and for the financial institutions that specialized in backing them. All but a handful of synthetic-fuels projects have now been abandoned, and the future of those remaining is doubtful.[1]

Several forces have joined to perpetuate a petroleum-driven boom in Alaska that has lasted longer than in other petroleum-exporting regions. Most crucial has been the fact that actual spending of state money appropriated in 1980 and 1981 has continued to increase month by month well into 1982. Another factor has been the momentum of North Slope oil exploration and development programs, some of which would be economical at any world oil-price level higher than (say) $10 per barrel. A third element in the present boom is a host of Anchorage commercial building projects for which tne key decisions and commitments were made before 1981. Finally, the continuing increase in the amount of state money actually flowing into the economy has combined with the flow of oil-industry investments to perpetuate a mood of high optimism among private investors in Alaska's non-energy industries, particularly residential and commercial real-estate development.

Nevertheless, in 1982, the beginnings of a

downward slide in world oil prices has already drastically altered the state government's official view of the future. From June 1980 through January 1982, the Alaska Department of Revenue's quarterly *Petroleum Production Revenue Forecast* had been predicting that nominal-dollar ("inflated") oil revenues would increase over the 4 years beginning on each forecast date at a compound annual rate between 12.2 and 25.8 percent. In its March 1982 *Forecast*, the department's 3-year estimate of the expected annual change in state revenues fell abruptly to a *negative* 0.8 percent.[2]

Specifically, the "most likely" projection in the March *Forecast* was that the weighted average wellhead value for Alaska North Slope (ANS) crude oil in fiscal year (FY) 1983 would be 29 percent lower than in FY-1982, and that world prices would then resume their nominal-dollar increase at a compound annual rate of about 7 percent. The department did not expect prices to regain FY-1982 levels until the beginning of FY-1987. With respect to constant-dollar ("real") oil prices, the March *Forecast* boldly reported "a consensus that oil prices will continue to fall,"[3] and projected declining real oil prices through 1998.[4] Table 1 above compares the state's June 1981 and 1982 forecasts.

Table 1

Petroleum-Revenue Projections by the Alaska Department of Revenue June 1982 vs. June 1981 (1982 constant dollars)

	Oil and Gas Revenue ($ millions)*		
	June 1981 Forecast	June 1982 Forecast	
Fiscal Year	"Expected Value"	"Expected Value"	"30-percent" Series
1983	4,030	2,654	2,399
1984	4,137	2,657	2,250
1985	4,271	2,623	2,177
1986	4,448	2,953	2,411
1987	4,713	3,305	2,644
1988	4,851	3,196	2,507
1989	4,983	3,365	2,595
1990	4,742	3,095	2,246
1991	4,544	2,714	1,862
1992	4,382	2,477	1,668
1993	3,979	2,285	1,427
1994	3,637	2,149	1,265
1995	3,144	1,826	1,059
1996	2,701	1,622	936
1997	2,289	1,608	908

*Includes royalties, production taxes, and corporate income taxes on petroleum products.

Source: Alaska Department of Revenue, *Petroleum Production Revenue Forecast, Quarterly Report*, June 1981, p. 13; Personal Communication, Charles Logsdon to Gregg K. Erickson, June 1982, p. 18.

The 1981 Turning Point

At the end of 1981, oil prices were suffering their greatest decline in half a century, but industry executives and forecasters—even outside Alaska—cautioned that the attendant "glut" was a temporary phenomenon.[5] Despite many signals to the contrary, that opinion has persisted well into 1982, with Occidental's Chairman Armand Hammer and others predicting $100-per-barrel oil in 10 years.[6] The scarcity mentality that fed the price leaps of 1974 and 1979, plus a belief that unpredictable Middle Easterners control the world oil market through OPEC, gave such assumptions nearly axiomatic status during the past decade. But the exporting nations' boast that "oil in the ground is a better investment than money in the bank" is turning out to be so much wishful thinking.

The truth is that neither an end to the recession, nor OPEC's attempts at production quotas, nor continued wars in the Middle East will long be able to shore up a sagging crude-oil market. It is, indeed, because oil prices climbed so rapidly and so high in the 1970s that they are now almost certain to fall and keep falling—perhaps as steeply and as far as they rose. Today's prices are still higher than markets can tolerate, and the forces that led to the enormous price hikes of the past decade work just as effectively in reverse.

While real (constant-dollar) crude-oil prices are unlikely to rise again to their 1980-81 levels any time in this century, forecasting prices for any specific future year is a nearly hopeless task. The fall in crude-oil prices that began last year will someday give way to another increase, and so on. As Table 2 and Figure 1 show us, crude oil markets are inherently *cyclical* and, except during a unique period of almost four decades when the State of Texas dominated both U.S. and world crude oil markets, oil price fluctuations have been large and frequent. *History shows us no long-term oil-price trends*, but only a series of cycles of uneven duration and amplitude. The era of OPEC's opportunistic price-gouging is over, but no other entity is in sight with the power to move oil prices in any consistent direction or to stabilize them at any given level.

Table 2

U.S. Crude-Oil Prices, 1870-1981
Current and Constant Dollars

	Crude-Oil Prices 1870-1972, Average U.S. Wellhead Prices; 1973-1981, U.S. Refiner-Acquisition Cost of Imported Crude Oil (Current Dollars per Barrel)	Price Deflator 1870-1925, Wholesale Price Index; 1925-1981, GNP Deflator (1972 = 100)	Price Deflator 1870-1925, Wholesale Price Index; 1925-1981, GNP Deflator (March 1982 = 100)	Crude-Oil Prices (1972 = 100)	Crude-Oil Prices (March 1982 = 100)
1870	3.36	26.53	.129	12.67	25.97
1871	4.34	25.54	.125	16.99	34.83
1872	3.64	26.72	.130	13.62	27.92
1873	1.83	26.13	.127	7.00	14.36
1874	1.17	24.76	.121	4.73	9.69
1875	1.35	23.19	.113	5.82	11.94
1876	2.56	21.61	.105	11.84	24.28
1877	2.42	20.83	.102	22.62	23.82
1878	1.19	17.88	.087	6.66	13.64
1879	.86	17.68	.086	4.86	9.97
1880	.94	19.65	.096	4.78	9.81
1881	.91	20.24	.099	4.50	9.22
1882	.77	21.22	.104	3.63	7.44
1883	1.09	19.85	.097	5.49	11.26
1884	.83	18.27	.089	4.54	9.31
1885	.86	16.70	.081	5.15	10.56
1886	.70	16.11	.079	4.34	8.91
1887	.71	16.70	.081	4.25	8.71
1888	.88	16.90	.082	5.21	10.68
1889	.94	15.92	.078	5.91	12.11
1890	.87	16.18	.079	5.38	11.03
1891	.67	15.98	.078	4.19	8.59
1892	.56	15.33	.075	3.65	7.49
1893	.67	15.66	.076	4.28	8.77
1894	.80	14.68	.072	5.45	11.17
1895	1.23	14.49	.071	8.49	17.41
1896	1.10	14.10	.069	7.80	16.00
1897	.76	14.16	.069	5.37	11.00
1898	.91	14.55	.071	6.25	12.82
1899	1.29	15.07	.074	8.56	17.55
1900	1.37	15.79	.077	8.68	17.79
1901	1.14	15.66	.076	7.28	14.93
1902	1.09	16.18	.079	6.74	13.81
1903	1.24	16.37	.080	7.57	15.53
1904	1.18	16.56	.081	7.12	14.60
1905	.90	16.95	.083	5.31	10.88
1906	.85	17.34	.085	4.90	10.05
1907	.84	18.06	.088	4.65	9.54
1908	.81	17.93	.087	4.52	9.26
1909	.76	18.58	.091	4.09	8.39
1910	.67	19.10	.093	3.51	7.19
1911	.68	18.90	.092	3.60	7.37
1912	.65	19.68	.096	3.30	6.77
1913	1.15	19.55	.095	5.88	12.06
1914	.98	19.94	.097	4.91	10.07
1915	.79	20.85	.102	3.79	7.77
1916	1.42	23.39	.114	6.07	12.45
1917	2.07	29.04	.142	7.13	14.61
1918	2.64	32.68	.159	8.08	16.56
1919	2.79	37.29	.182	7.48	15.34
1920	4.30	42.48	.207	10.12	20.75
1921	2.21	35.40	.173	6.24	12.80
1922	2.10	32.55	.159	6.45	13.23
1923	1.68	33.32	.163	5.04	10.33
1924	1.81	33.26	.162	5.44	11.16
1925	2.19	33.71	.164	6.50	13.32
1926	2.41	33.19	.162	7.26	14.88
1927	1.72	32.48	.158	5.30	10.86
1928	1.68	33.00	.161	5.09	10.44
1929	1.78	32.87	.160	5.42	11.10
1930	1.62	31.80	.155	5.09	10.44
1931	.93	28.89	.141	3.22	6.60
1932	1.17	25.67	.125	4.56	9.34
1933	.92	25.14	.123	3.66	7.50
1934	1.36	27.32	.133	4.98	10.20
1935	1.31	27.83	.136	4.71	9.65
1936	1.45	28.01	.137	5.18	10.61
1937	1.58	29.34	.143	5.39	11.04
1938	1.46	28.66	.140	5.09	10.44
1939	1.32	28.48	.139	4.63	9.50
1940	1.32	29.13	.142	4.53	9.29
1941	1.48	31.34	.153	4.72	9.68
1942	1.53	34.39	.168	4.45	9.12
1943	1.54	36.18	.176	4.26	8.73
1944	1.56	37.03	.181	4.21	8.64
1945	1.58	37.92	.185	4.17	8.54
1946	1.82	43.95	.214	4.14	8.49
1947	2.50	49.70	.242	5.03	10.31
1948	3.39	53.13	.259	6.38	13.08
1949	3.30	52.59	.257	6.27	12.86
1950	3.31	53.64	.262	6.17	12.65
1951	3.34	57.27	.279	5.83	11.96
1952	3.34	58.00	.283	5.76	11.81
1953	3.55	58.88	.287	6.03	12.36
1954	3.68	59.69	.291	6.17	12.64
1955	3.67	60.98	.297	6.02	12.34
1956	3.71	62.90	.307	5.90	12.09
1957	3.89	65.02	.317	5.98	12.26
1958	4.09	66.06	.322	6.19	12.69
1959	4.00	67.52	.329	5.92	12.14
1960	3.87	68.67	.335	5.64	11.55
1961	3.87	69.29	.338	5.59	11.45
1962	3.89	70.55	.344	5.51	11.30
1963	3.88	71.59	.349	5.42	11.11
1964	3.87	72.71	.355	5.32	10.91
1965	3.89	74.32	.363	5.23	10.73
1966	3.88	76.76	.374	5.05	10.36
1967	3.90	79.02	.385	4.94	10.12
1968	3.93	82.57	.403	4.76	9.76
1969	4.15	86.72	.423	4.79	9.81
1970	4.29	91.36	.446	4.70	9.63
1971	4.56	96.02	.468	4.75	9.74
1972	4.57	100.00	.488	4.57	9.37
1973	5.38	105.80	.516	5.09	10.42
1974	12.52	116.02	.566	10.79	22.12
1975	13.93	127.15	.620	10.96	22.46
1976	13.48	122.71	.599	10.99	22.52
1977	14.53	141.70	.691	10.25	21.02
1978	14.57	152.05	.742	9.58	19.62
1979	21.67	165.46	.807	13.10	26.85
1980	33.89	177.36	.865	19.11	39.17
1981	36.80	193.58	.944	19.01	38.97

Market Control by the Texas Railroad Commission (1935-1972)[7]

To understand OPEC's helplessness in today's crude oil market, it is useful to review how the market operated before OPEC came to power, and how the Texas Railroad Commission (TRC) managed to exercise control for nearly 40 years.

The TRC's rule emerged in the mid-1930s from circumstances quite different from those that nurtured OPEC in the 1960s and 1970s. In the era between 1859, the year Colonel Drake first discovered oil in Pennsylvania, and the Great Depression, crude oil markets everywhere were dominated by events in the United States, where one black-gold rush after another unleashed an oversupply and sent prices plummeting.[8] Growing oil demand rapidly restored prices after most of these crises, as petroleum captured markets that were previously held by whale oil, gas, or coal, and as the automobile population swelled.

The Yates field in Texas, for example, was first tapped in 1926. It was the biggest field yet found, and over its first year of production, average crude oil prices in the United States fell 24 percent. Prices recovered quickly, but in 1930, the beginning of the Depression coincided with discovery of the even larger East Texas field. Oil literally ran in the creeks, and prices fell locally to 10 cents per barrel.

Much of this market chaos resulted from the common-law "rule of capture." The principle that nobody owned oil until it was brought to the surface generated frenzied competition among drillers to lift as much as oil as they could from each newly-discovered pool before their neighbors got it. The east Texas drilling rush ended in 1931 only when the governor sent the National Guard into the field to shut down production. The next year, a bitterly divided Texas legislature granted the TRC authority to limit output from individual wells in the interest of conservation and market order. Under "market-demand prorationing," refiners told the TRC how much oil they wanted to buy each month, and the Commission parceled out the "allowable" share of this demand to each well. This system assured every Texas producer a buyer for at least some of his oil, no matter how much excess producing capacity other producers held. The TRC's ability to stabilize the market was bolstered by market-demand prorationing in several other states including Louisiana, the number-two U.S. producer. Under state regulation, physical shortages and surpluses both became a thing of the past; "conservation" replaced physical waste, and the violent short-term fluctuations of crude oil prices ended.

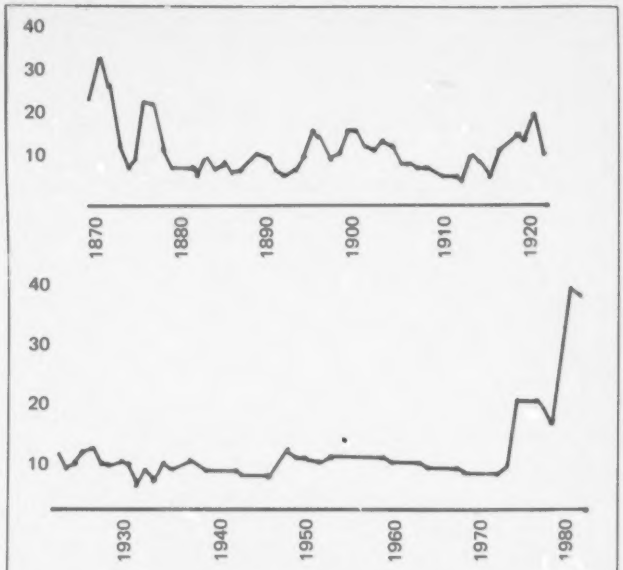

Figure 1. U.S. Crude Oil Price Trends, 1870-1981
(March 1982 constant dollars)

Even more important were a series of federal actions backstopping TRC authority. In the 1935 Connally "hot-oil" law, Congress made it a federal crime to ship oil produced in violation of state conservation orders. After World War II, the executive branch acted to prevent uncontrolled imports of low-cost foreign crude oil from undermining the states' control of U.S. oil supplies. For a while, the handful of largely U.S.-based oil companies that controlled the oil reserves of the Middle East and the Caribbean cooperated successfully in limiting petroleum production from their foreign concessions to just about the amount demanded by their own foreign refineries.

Nevertheless, by 1948, the huge low-cost oil reserves overseas had become enough of a threat to Texas regulation that the Truman administration started assigning "voluntary" import quotas to the companies. In 1958, after independents like Hunt and Occidental developed enormous new reserves in Libya, President Eisenhower established a mandatory oil-import program (MOIP). The MOIP gave each U.S. refiner the right to import some lower-priced foreign oil, but it enabled the TRC and other state conservation authorities to continue setting the total volume of crude oil supplied to the domestic market.[9]

Critics of market-demand prorationing and import quotas, including the 1970 Cabinet Task Force on Oil Import Control, headed by George Shultz, saw the combination mainly as an arrange-

ment that kept U.S. prices artificially high and perpetuated wasteful excess capacity. It did, indeed, shut in much of the nation's lowest-cost oil, while creating an incentive to develop domestic fields that would not have been viable in a free market.[10] But precisely because it sheltered surplus producing capacity, Texas prorationing functioned as the balance wheel of the world oil market for four decades. Texas was the "price-maker"; the TRC determined the price all domestic producers received for their oil, and it was at the same time the most powerful single force in the world crude oil market. Other producers were relegated to the passive role of "price-takers" who could always sell as much or as little oil as they wished, once they accepted the price structure established by Texas.

The TRC could play the price-maker's role because it had control over sufficient spare producing capacity to supply refiners with all the Texas oil they wanted at the established price, offsetting any rise in demand prompted by boom conditions or long-term economic growth, or any drop in output by other producers at home or abroad. The Commission also had the power to enforce production cuts if necessary to prevent a surplus from appearing when oil demand waned or production outside Texas increased.

The Texas system worked nearly 40 years, through World War II, the U.S. recessions of the 1950s, and several supply disruptions caused by Middle Eastern political upheavals in the 1950s and 1960s. Oil supplies were seriously curtailed in 1952-54, for example, following Mossadeq's nationalization of the Iranian oil concessions; during the Suez crisis of 1956; and again during the 1967 Yom Kippur War. U.S. and world crude-oil prices remained relatively stable, however, as the majors produced more oil in the unaffected Persian Gulf countries, while the TRC and other state commissions increased production at home. From 1935 to 1972, roughly the period of the TRC's domination of the world market, the average annual change in real crude-oil prices in the United States was only 4 percent, plus or minus, a stark contrast to the average annual change of 21 percent between 1871 and 1935.[11]

One reason for the TRC's success was that it did not exploit its market power opportunistically. The 1952, 1956, and 1967 Middle Eastern conflicts offered Texas producers (and the state of Texas, a major royalty owner) a chance for huge short-run profits, as they did the big international oil companies. But each time, the TRC and the majors opted for long-term stability, forestalling the kind of consumer panic that generated the price run-ups of 1974 and 1979 after the TRC had lost control.

Once domestic production reached full capacity in 1972, the U.S. Government had no choice (politically, at least) other than to do away with import controls, leaving consumers exposed to whatever upheavals might occur in the oil-exporting countries. Meanwhile, nationalization of the major oil companies' overseas concessions, plus the growing influence of independents (including national oil companies like those of France, Italy, and Brazil), had stripped the majors of their ability to balance supply and demand outside of North America. A supply curtailment by the Arab oil producers, which would have hardly caused a ripple in oil prices 10 years or even 2 years earlier, transformed world energy markets and, for a few years at least, handed control of those markets to OPEC.

Panic Pricing in 1973-74 and 1979

OPEC's spectacular successes in the 1970s were due more to market psychology rather than to anyone's direct manipulation of crude oil supplies. OPEC *per se* did not engineer either of the decade's great price leaps; they came instead from *consumer panics* that spread through the spot market after the 1973-74 Arab embargo and the 1978 Iranian revolution. In both cases, OPEC merely voted, *after the panic had run its course*, to establish the prevailing spot prices as the base prices for all crude oil sales.

Crisis psychology was thus the key to the short-term oil market behavior that ratcheted prices upwards. The physical shortfall that provoked the panic of 1973-1974 was proportionally no greater than the shortfalls (or excess supplies) that the industry faced periodically because of unusual weather or the business cycle, and there was no reduction in output at all immediately before the 1979 price spiral. In neither case was the actual shortage greater than the sum of (1) the oil then being consumed by electrical-generating and manufacturing plants that had the capacity to use other fuels, (2) the standby or underutilized oil-producing capacity of U.S. and uninvolved foreign producers, and (3) the inventory cushions that industry ordinarily would have drawn down in order to prevent market turmoil.

The price leaps, rather, began both times with a handful of large-scale buyers who believed that the "shortage" was real, and who were thus willing to pay almost anything. The crisis mentality had a powerfully perverse effect on the market; instead of restraining demand, soaring spot prices gave the shortage credibility and helped propagate the panic to every class of consumer, so that demand actually increased. Much of the apparent supply deficiency

was caused by hoarding, the most memorable example of which was the fashion of topping-off gasoline tanks daily in private automobiles. This practice alone probably created demand for an additional 600 million gallons of gasoline in the United States.[12]

However socially irrational that hoarding may have been, it seemed quite reasonable at the time from an individual company or consumer standpoint. In 1973-74, both the Arab producers and the Western media were insisting that the embargo and production cutbacks were in fact harming the consuming countries. Congress had passed an Emergency Petroleum Allocation Act; President Nixon had declared an "energy emergency" and had begun allocating crude oil and petroleum products.

No one knew how long the apparent shortage would last or how high prices might go before it was over; hence, it made sense for anyone with a preferred position in the allocation scheme to take every drop of price-controlled gasoline or fuel oil allowed under the rules, regardless of current need, and for every other consumer to buy as much at the prevailing price as he could store. Motorists, households, and businesses all sought to build up and maintain high inventories in case things "really got bad" later, while producers, refiners, and others expected to profit from holding products for resale at higher prices in the future. All of these anticipations, of course, validated themselves: supplies did get tighter and prices continued to rise.

The Role of Spot Prices[13]

Oil producers and refiners usually try to plan their physical operations and to budget their purchase outlays and revenues well in advance. For this reason, the great bulk of the world's crude oil moves in "captive" channels from producing companies to their own refinery affiliates or on relatively long-term contracts between producers and refiners. "Spot" transactions—sales of a single tanker-load or less—usually account for only a few percent of world supply, but they are an indispensable part of the total market because they allow any company or government to dispose of a temporary oversupply or fill a temporary shortfall. A general surplus or shortage equal to only (say) 3 percent of total world demand may thus show up as a surplus or shortage amounting to 50 or 100 percent of normal spot-market demand. As a result, spot prices tend to fluctuate daily and seasonally, and to range widely above and below "posted" or contract price levels, which typically change slowly and infrequently.

Changes in crude oil spot prices occasionally herald deep-seated market changes, but more often they are only exaggerated reflections of unexpected weather or business conditions, the buildup or drawdown of inventories, or political events. After some such contingency has caused a spot prices to diverge sharply from contract prices, the spot market normally returns to a relatively narrow band of prices in the vicinity of previous contract-price levels. What was special about the OPEC-dominated markets of the 1970s is that they twice failed to respond in this normal way. After the panics of 1973-74 and 1979, spot prices did *not* fall back to pre-crisis levels; instead, contract prices rose—by OPEC decree—to the peak values to which the panic had carried spot prices. This feat was OPEC's great triumph which, ironically, is now begetting its downfall.

The Power of Saudi Arabia and OPEC

The TRC determined prices by actively manipulating the aggregate supply of crude oil; as a state agency, it had the power to enforce its orders on the many thousands of Texas producers regardless of their conflicting individual interests and viewpoints. OPEC, on the other hand, has never had any authority over the diverse and sometimes warring sovereignties that make up its membership.

Nevertheless, in the early 1970s, once the surplus capacity of Texas and Louisiana had disappeared, Saudi Arabia by itself conceivably could have taken over the TRC's balance-wheel role. Its potential authority came from a combination of the world's largest reserves of conventional crude oil and a population on the order of only 5 million. The Saudis have thus had the same mix of assets, at least theoretically, that earlier gave the TRC its power—the ability to *increase or decrease* output over a wide range.

Proved and indicated reserves in Saudi Arabia number in the hundreds of billions of barrels—how many hundreds, no one knows or much cares, because it has never been worthwhile to carry out the intensive exploration and development work needed to get an accurate estimate.[14] The known reserves are, in any event, so large and so easy to develop that it would take Saudi Arabia only a few months to double its exports from the current level of less than 6 million barrels per day. (After all, production was almost 11 million barrels per day only one year ago.) With 2 or 3 years for drilling of development wells and construction of gathering lines and terminals, exports probably could rise to something like 18 million barrels per day. Indeed, before the 1973 embargo, the big oil companies (the Aramco shareholders) that controlled the Saudi concession were

planning for production on the order of 20 million barrels per day by 1976.

Saudi market power rests on the ability to curtail as well as to increase production. The country's small population has permitted Saudi Arabia to reduce its output by almost half over the last year, from 10.6 million barrels per day in August 1981 to less than 5 million in November 1982, without suffering a fiscal or foreign-exchange crisis. Throughout the 1970s, therefore, Saudi Arabia, with or without the cooperation of other OPEC nations, had much of the wherewithal to stabilize the market in the same way as the Texas Railroad Commission once did.

The OPEC Mystique

It was a worldwide obsession with scarcity, rather than deliberate management of total world supplies, that underpinned the OPEC mystique and locked in the high prices OPEC decreed in 1974 and 1979 after the direct causes of panic had vanished. The doctrine of imminent resource exhaustion was embraced in the 1970s by a broad spectrum of parties who had entirely different world views and different ends.

Environmentalists hoped to slow the wasteful plundering of the earth's riches; oil companies were seeking to ward off price controls and attacks on their tax preferences; alternative-energy entrepreneurs sought business; politicians found in the energy crisis a moral equivalent of war; civil servants made it the rationale for massive expansion of their agencies and intervention into almost everything; and an army of academics, consultants, and journalists waxed rich and famous by studying, interpreting, or advocating national energy policies. Each group wanted to believe, or at least to persuade others, that "the wolf is really here"—that OPEC's prices might have risen too abruptly for comfort but that, in the last analysis, those prices only expressed the dictates of geological necessity.

"Oil in the Ground is Better than Money in the Bank"

In this intellectual climate, each price increase, regardless of its proximate cause, helped convince the oil-exporting nations that "oil in the ground is a better investment than money in the bank." This doctrine could remain valid for just as long as most producers believed in it, because it encouraged them to hold oil off the market in the faith that its value would be much higher in the future. It was therefore the most effective and durable weapon in OPEC's ideological arsenal.[15] Although the organization had no enforcement machinery, and did not even attempt a prorationing scheme until 1982, its members did reduce production when preservation of the price gains of 1974 and 1979 required it.

When the OPEC nations cut back their total exports in 1974 and again in 1979, it is important to note that they made the required cuts individually. They did so *without coordination or urging by OPEC*, because they had more money than they needed at the moment, and because they believed that their oil would be worth more later. Even the 1973-74 price rise had been so immense that most OPEC countries had substantial financial surpluses; only Algeria, Ecuador, and Indonesia were in deficit. In 1975, OPEC as a whole had a $59-billion (or 14-percent) surplus of export revenues over import expenditures. Several countries understandably concluded that their economies couldn't absorb further increases in oil income without generating intolerable inflation and social unrest.

It also seemed obvious to the producers that oil prices would continue to advance at a higher rate than their surplus cash would yield in risk-free financial instruments. Thus, Kuwait, Libya, and Venezuela together reduced their exports by 4 million barrels per day after the 1974 price rises. Saudi Arabia abandoned Aramco's 20 million barrel-per-day target in 1974, and cut production sharply in January 1979 and then again in April—ostensibly to offset an imminent oil glut, which was in fact an aftermath of the price panic that followed the overthrow of the Shah. In neither price rise did OPEC as such have any role in initiating or orchestrating the curtailments.

Thus, a short-lived belief in acute scarcity twice created a real scarcity that caused spot prices [illegible]r. A belief that chronic energy shortages would engender a permanent seller's market then led producers and consumers alike to interpret an unusual and otherwise transitory market phenomenon as obedience to holy writ. The self-fulfilling doctrine that oil in the ground was the world's best investment not only encouraged OPEC officials to adopt spot market prices generated by consumer panic; it also enabled those prices to stick. [illegible], the world price of crude oil (measured at the Persian Gulf) increased fivefold in real terms, and then in 1979-80 it again tripled (a vivid contrast to the decades of tranquility under the TRC).

The End of the OPEC Era

OPEC's hold over world energy markets in the 1970s was no less real because it was mainly psychological. However, the cartel's mystique is far more fragile than the earlier market power of Texas,

which stemmed from the TRC's direct control over production volumes. Today, few of the material requisites for further OPEC success remain. Its share of the world oil market has fallen from 55 percent in 1974 to 27 percent in October 1982, and Saudi Arabia's share is already less than the share Texas held as late as the mid-1960s.

Some recognition of these shifting realities began to strike the Saudi leadership only after two deliberate production cuts in 1979 had locked in a series of huge price increases voted by OPEC. Saudi Arabia's actions have now become more-or-less consistent with the professions of the kingdom's oil minister, Sheikh Yamani, who had long given lip-service to the cause of moderation and market order. Explicitly invoking the memory of the TRC, Yamani claims to have engineered the 1980-81 "oil glut"—increasing production from less than 8 million barrels per day to almost 11 million, specifically in order to bring prices down to $34 per barrel and to persuade his OPEC partners that they should join a prorationing scheme under Saudi leadership. In 1982, after succeeding too well, perhaps, the Saudis have abruptly reversed course, now *cutting* their exports by over half in an attempt to support the $34 price.

But Saudi Arabia appears to have been too late in discovering the market power it alone possessed. While the TRC held crude oil prices in the United States above short-term free-market levels, it still kept them low enough to encourage ever-increasing oil consumption and stave off the development of alternative energy sources. The Saudis, however, wittingly or unwittingly had a key role in both OPEC price shocks of the 1970s, unleashing inexorable and profound reactions from both producers and consumers, which today threatens to make OPEC oil a dispensable commodity.

Contrary to a near-consensus of industry, government, and the academic/consulting community during the 1970s, crude oil demand does respond—slowly but massively—to price changes. In the long run, higher prices have a profound effect on oil supply too, but the relationship is too complex to pursue in detail here. In any event, non-OPEC output has grown rapidly and will continue to grow: production from the North Sea, Alaska, and Mexico, for example, increased by 4 million barrels per day between 1977 and early 1982, and Mexico's exports—driven now by economic necessity—could increase another 3, 5, or more millions of barrels per day before 1990. Most clearly and most importantly, however, high oil prices are shrinking oil demand both by reducing total energy consumption and by making coal, natural gas, nuclear power, and other energy sources more attractive.

The Flight from Oil

After a modest dip in 1974, total world oil consumption resumed its growth, and finally turned down only 1979. This experience reinforced the impression that oil demand was insensitive to price changes, misleading economists as well as industry executives and government officials in both oil-producing and oil-consuming countries. An absolute decline in U.S. oil consumption was first visible in 1979; the rest of the industrialized world followed a year later. In retrospect, it is remarkable how many were unable to see what was happening.

Exxon in 1977 forecast that U.S. consumption of petroleum liquids would be *20.3 million barrels per day in 1980*. In 1979, Shell predicted *18.6* million barrels per day consumption in 1980, and both the *Oil and Gas Journal* and the Independent Petroleum Association of America (IPAA) forecast 18.4 million. As late as mid-1980, Shell had only revised its published estimate downwards to *17.2* million barrels per day, while the IPAA had come down to *17.4. At year-end in 1980, however, average consumption for the year stood at only 16.3 million barrels per day*.[16]

The drop in total oil use over the last 3 years and the experts' tardiness in recognizing the trend of consumption stems from profound changes in the structure of world energy demand that have actually been under way since 1974. From 1960 to 1973, oil prices were low and declining in real terms. As a result, absolute oil consumption in the industrialized countries grew at an annual rate of 7.6 percent. Japan led this growth with an 18-percent average over the 13-year period. After 1974, however, the quadrupled crude oil price led to a gradual leveling off of demand for oil everywhere. Total oil consumption in the industrialized countries dropped slightly in 1974-75; growth resumed between 1975 and 1979 at an annual rate of about 1 percent, but this partial recovery only concealed the fundamental shift that had taken place in the world's energy-use patterns.

More telling than gross consumption figures is the change in oil use per unit of economic activity, or "gross domestic product"—the oil/GDP ratio. After rising at an annual rate of 1.3 percent from 1960 to 1973, the oil/GDP ratio for the major industrialized countries showed a 1.5-percent annual *decline* between 1973 and 1979. The 1979 upheaval initiated an even more decisive and long-lasting shift away from oil, reflecting both an immediate reaction to the second OPEC price surge and the delayed but cumulating response to the price increases of the early

1970s. From 1979 to 1981, oil consumption in the industrialized countries fell 7 percent per year, and the oil/GDP ratio fell at an annual rate of 8 percent.

Since the latter measure represents the amount of oil used *per unit of economic activity* rather than an absolute figure, its fall implies that an end to the present recession will not be the panacea that much of the energy industry and many analysts still seem to anticipate. The die has been cast. It is unlikely that individual homeowners will tear the insulation out of their houses if the price or home heating oil drops, or scrap their new fuel-efficient automobiles in response to lower real prices for gasoline. Nor will the housing construction and automobile industries abandon their new energy-efficient designs. Those who attribute the oil glut and the current "softness" of oil markets primarily to the world recession forget that economic recovery will mean a *more rapid replacement* of existing vehicles, industrial machinery, and buildings with models designed since 1974 in response to high energy prices.

Except in a couple of OPEC countries, no new base-load electrical generating plants fired by oil, or any large-scale oil-fired boilers of any sort, have been built since the mid-1970s; over the past decade, industry has been relentlessly converting existing oil-burning equipment to coal, natural gas, and other energy sources. Because changes in the world's fuel-use patterns are generally embodied in long-lived capital-intensive investments such as buildings, transportation equipment, and industrial machinery, the extended period it has taken for the 1974 price rises to produce an absolute decline in oil consumption only reflect the time required to replace these assets. This long lag in adjusting the world's capital stock to changed energy-supply conditions also suggests that the all-time high oil prices of 1974-1982 will influence consumption patterns for many more years, *even if world oil prices now fall as rapidly and as far as they rose in the 1970s.*

The truism that the world's petroleum resource is finite thus does not mean that oil prices will continue to rise. The world has no demand for crude oil as such, but only for the heat, motive power, and chemical building blocks it provides, and only for so long as it is the cheapest source of these goods. No matter how scarce natural petroleum liquids become, their prices cannot rise and remain above the cost at which each of these wants can be dispensed with or served in some other way.

It should be fairly obvious now that predictions of $100 per barrel oil are ludicrous. At $15 per barrel, oil was already more expensive than coal everywhere in the world, and had consequently priced itself out of electrical-generation and other large-scale stationary-heat and boiler-fuel markets. At well under $50 per barrel, given a few years for market and infrastructure development, liquid petroleum products would have become marginal even as transportation fuels, increasingly replaced by some combination of compressed and liquefied hydrocarbon gases and alcohols. A world that is already fleeing from oil at $32 per barrel would hardly have any use for it at two or three times that price.

This dynamic does not bode well for OPEC, or for the ability of Saudi Arabia or anyone else to manipulate or stabilize the market. Only when demand falls is the power of a price-maker tested. Can the OPEC nations, many of whom are deeply in debt, now afford to cut back production as they must?

On this point too, the OPEC of 1982 is as different from its predecessor, the Texas Railroad Commission, as it is from the OPEC of the mid-1970s. In comparing OPEC with the TRC, it is essential to remember that the Commission's power developed during the Depression, and that its institutions were designed expressly to manage a chronic excess of producing capacity. Once that excess was gone, the TRC became impotent and economically irrelevant. OPEC, in contrast, showed its muscle under totally opposite conditions. It twice seized upon a brief moment of consumer panic, convinced itself and consumers alike that a permanent world oil scarcity existed, and for a while reaped the benefits of a seller's market even after the foundations of that market had vanished.

There is little prospect that OPEC can function effectively in a chronic buyer's market, especially in the face of the organization's current internal dissensions and the precarious financial situation of its members. At its March 1982 meeting, the group made its first serious attempts at TRC-style prorationing. The experiment was an instant failure, with at least three members brazenly exceeding their quotas from the beginning.[17] By July 1982, Iran was selling 1.0 million barrels per day above its quota, Nigeria .3 million, and Libya .25 million. Venezuela—the sole advocate of OPEC prorationing before 1980—had threatened to start selling more than its assigned 1.5 million barrels per day if the other countries didn't get in line. In August, the Saudis, who had already reduced their own output by 45 percent in the hope of supporting the $34 marker price, were also hinting that they would raise their own output if the cheating did not stop.[18]

Even holding the line at today's production level

is not enough to bolster OPEC's flagging power, as world oil consumption continues to shrink and the production of nonmembers—especially Mexico—continues to grow. The organization as a whole must somehow manage to reduce production even further if present prices are to hold. Yet its member-nations individually face internal problems and pressures that urge them in just the opposite direction.

The greatest source of downward pressure on prices is the shaky financial condition of the exporting countries, a drastic turn-around from the situation of 1975. Since 1973, OPEC spending for imports has risen at an average annual rate of 30 percent, because of ambitious industrialization plans in every one of them and extravagant purchases of military hardware in many. Already, the combination of declining oil demand and rapidly rising expenditures has resulted in trade deficits for all but three OPEC members. Unless oil production or prices increase sharply, every member, including Saudi Arabia, could slip into deficit by the end of 1982.

These deficits, exacerbated by the continuing Iran-Iraqi war, are already beginning to take their toll as the most hard-pressed countries, in search of revenues to pay for today's imports, produce as much oil as they can sell. Moreover, with declining or even stable prices and real (inflation-adjusted) interest rates at their highest level in history, the slogan that oil in the ground is a better investment than money in the bank is obsolete even for countries that do not have an immediate cash-flow or foreign-exchange deficit. In the 1980s, it is hard for even a cash-surplus oil-exporter to avoid recognizing that *oil in the ground is a non-earning asset*, which ought to be cashed out so the proceeds can be invested in high-yielding financial instruments. This doctrine is just as true and may be just as self-fulfilling today as was the opposite notion in 1975 or 1979.

To put OPEC's weakness into further perspective, consider the following:

- In August 1982, world crude oil production was about 54 million barrels per day. Out of this total, the Saudi share was about 5.5 million, or 10 percent; all of OPEC was producing about 17 million barrels per day, or 31 percent of world supply. If new production in non-OPEC countries plus further declines in consumption were to equal only 10 percent of present world demand, OPEC's members would have to reduce their own production by 32 percent in order to defend any chosen price level.

  Saudi Arabia, which has already reduced its exports by 45 percent over the last year, cannot and will not accommodate much of this burden, as a 10-percent shift in world supply or demand would be just about equal to the country's current export volume. Further growth in non-OPEC production and a further fall in world consumption are not only plausible but nearly inevitable. Thus, Saudi Arabia's reign as world price-maker is ending virtually as soon as it began.

- Conservation, fuel-switching, and recession caused the noncommunist world's oil consumption to fall by 7.5 million barrels per day between 1979 and mid-1982. If consumption declined by only half as much over the next 2 years, OPEC's output would have to fall by an amount equal to the combined production of Kuwait, Libya, Algeria, and Indonesia in August 1982, or by 68 percent of current Saudi output.

- Crude oil production from Alaska, Mexico, and the North Sea increased by more than 4 million barrels per day between 1977 and 1981. If all non-OPEC producers were to increase their output by another 4 million, OPEC could maintain control of prices only if its members could cut production by at least the equivalent of 73 percent of the August 1982 Saudi Arabian production.

- Production from Iran, the world's former number-two oil exporter, has fallen 4 million barrels per day from its 1974 peak. The former number-three exporter, Iraq, is producing 2.6 million barrels per day less than its 1978 peak it reached in 1978. If the war between these countries should end and they returned to the market with their 1978 sales volumes, other OPEC countries would have to curtail production by an amount equal to 90 percent of the August 1982 Saudi output.

- Finally, if by chance the last three developments all took place, and if OPEC hoped to sustain world prices at current levels, it would have to find places to cut production by at least 12.7 million barrels per day—75 percent of the organization's current output, or 231 percent of August 1982 Saudi production.

The range of conditions within which OPEC, Saudi Arabia, or anyone can continue to dictate or even defend the level of world oil prices is thus extremely narrow. The reckless opportunism that held sway in the 1970s is now taking its toll. Long-term changes in supply and demand adverse to OPEC's interests have been under way ever since the cartel's first big coup in 1974. As these changes become visible to everybody, the mystique that has

been OPEC's chief source of power will vanish along with forecasts of hundred-dollar oil. The world market will soon be, if it is not already, out of anyone's control.

What Have We Learned?

A big new disturbance in world oil markets could push prices either up or down. It is still conceivable, if only barely so, that a sharp economic upturn and an exceptionally cold winter could combine with the right kind of Middle Eastern political crisis and send prices soaring for a third time to levels significantly above those reached in 1980-81.

The probabilities, however, weigh heavily on the other side. There is a huge overhang of excess producing capacity in the oil-exporting countries. Several of them are in extreme fiscal distress; Mexico in particular has both the ability and a desperate need to increase oil exports. Meanwhile, the price-induced flight from oil is still gathering a momentum that will not be spent for years, *no matter what happens to oil prices today*.

All of these forces together, not to mention a worldwide economic slump that is far from over, add up to irresistible downward pressure on oil prices. Prices must *eventually* go down, and they must go down substantially. The serious questions are whether they will descend smoothly or chaotically, and how deep they will go. There is still a sliver of a chance that prices could firm for weeks or months, or even—given the unlikely coincidence of events described above—increase once more. But an oil market collapse this year or next has a far bigger likelihood—a collapse every bit as spectacular as the two price eruptions of the 1970s.

Looking back across the years of OPEC and energy crises to the relative tranquility of the TRC era and beyond, there are several lessons for the future.

1. **Worldwide scarcity and rising real resource costs had little or no direct responsibility for the energy price upheavals of the 1970s.**

The earth's *known* resources still include plenty of crude oil that could be developed and produced at resource costs (capital, material, and labor costs) well below 1973 real prices. Considering these resources alone, there is enough low-cost oil left to satisfy the world's current rate of consumption for several decades.

2. **In the absence of an effective price-maker like the Texas Railroad Commission, crude-oil markets are inherently cyclical.**

Oil demand is highly responsive ("elastic") to price changes, but this response is very slow, because fuel-use patterns are embodied in capital goods whose turnover is measured in decades: buildings, transportation equipment, industrial machinery, and production processes. For the same reason, demand is exceedingly inelastic to price changes in the short run. This contrast between short- and long-term price-responsiveness inevitably fosters cyclical price behavior. In the 1970s, *short-term price-inelasticity* spawned a steep cyclical upswing after years of artificially-maintained stability, and in 1981, a high *long-term price-elasticity* finally began to show itself in the beginning of a downswing.

If there is no "surge-tank" or "damping" mechanism comparable to market-demand prorationing, moreover—

3. **Market structure and psychology can exaggerate an episodic oil-price fluctuation, up or down, far out of proportion to the original supply-demand imbalance that triggered it.**

Inventory accumulation or liquidation, the financial position of major producers, and consumer panic can all cause markets to behave perversely over a "short-run" that can last for several years. In a mockery of the "normal" supply-demand map, an oil-price rise can for a while create an incentive to build inventories, and sustained price rises can encourage the withholding of production. A price reduction, likewise, can provoke liquidation of inventories and the expansion of output. As a result—

4. **A small excess of demand or supply, real or imagined, can send the market soaring or plummeting far beyond the price level that ultimately could have brought it back into balance.**

Thus, there is no *stable* equilibrium toward which an unregulated petroleum market unfailingly "hunts" once it is disturbed. The upheavals of the 1970s, which carried prices well *above* any level that could be long sustained, have now set the stage for a descent far *below* the range of sustainable prices.

5. **No cartel or regulatory system could have held world oil prices at the low levels of the early 1970s, and none can do so in the future.**

Before 1973, state regulators in the United States and the cartel of international companies maintained prices that were above the shortest-term "market-clearing" levels, but which were still so low

that oil totally dominated transportation-fuel markets (even capturing railroads that had earlier been powered by electricity generated from coal). Except in a small corner of the United States, these low oil prices virtually swept coal from the world's markets for industrial boiler fuels and organic-chemical feedstocks. At the same time, however, the prices were too low to perpetuate the surplus oil-producing capacity in the United States, to which the state regulators owed their market power. Though the world's stock of very low-cost oil was still immense, the loss of spare capacity in the United States concentrated the power to rapidly increase or curtail production in a handful of economically underdeveloped and politically turbulent countries.

The problem, therefore, was not a permanent worldwide scarcity of "cheap" oil. Instead, it was the absence of short-term oil-demand flexibility, together with the disappearance of the short-run supply flexibility that had previously been exercised by governmental and private institutions consciously striving for market order. In these circumstances, a relatively small curtailment of sales by a few producers openly aiming at market disruption could and did trigger an upward explosion of prices. If world oil prices now fell to pre-1973 levels (in constant-dollar terms) once more, a world-wide "energy crisis" would be with us again sooner or later. Likewise, however—

6. No group of producers could long hold world oil prices at the high levels of the early 1980s, and it is unlikely anyone will ever be able to do so.

Today's prices area not viable, because they are well on the way to pricing oil out of both the industrial fuels market and the market for petrochemical feedstocks. If prolonged, today's prices would even begin to erode oil's monopoly in transportation-fuels markets. Oil at $30 and up has, therefore, guaranteed the emergence of excess producing capacity not in just one or a handful of political entities (Texas and Lousiana, for example, or Saudi Arabia, Kuwait, and Abu Dhabi), but all over the globe.

7. Market stability at any price requires the supply-demand balance to respond promptly and in the normal direction to any price change, and requires and requires prices to respond promptly and in the normal direction to any change in the supply-demand balance.

If the world is to avoid repeated violent swings in oil prices, market arrangements must be such that a small rise in oil prices can cause either a sizable *increase in effective oil supply or a sizable decrease in oil consumption*, or both. A small drop in prices must, likewise, be able to induce a prompt reduction in supply or increase in consumption.

8. Short-term supply-side adjustments that foster price stability rather than instability require a TRC-style price-maker, but none is now in sight.

Any supplier or group of suppliers that hopes to regulate the market must have the ability and the will to swing world oil production upward to satisfy any surge of demand or supply interruption, or (more importantly now) to swing it downward in order to make room for a surge of supply or slump in demand. The system run by the TRC, through *underpricing*, destroyed its power to increase output whenever it was needed. OPEC as such never had *either* the will or the capacity to take responsibility, and Saudi Arabia—out of greed or timidity, we may never know—blew its chance. It has now, through *overpricing*, destroyed its ability to reduce production sufficiently to support world prices at present levels or, most likely, at any level.

The only plausible new candidates for price-maker may be PEMEX (Mexico's state oil company) and the U.S. Strategic Petroleum Reserve. However, even if one of them maneuvers itself into the right strategic spot in the world market, there is only the barest chance that domestic politics in the United States or Mexico would permit either institution to move quickly, independently, and responsibly enough to serve as the world's oil-supply balance wheel.

9. The only price level that even a supply-side price-maker can maintain for long is one that fosters demand-side stability as well.

10. Specifically, the range of sustainable oil prices is limited to those prices at which oil, coal, and gas are effective and close competitors in the world's markets for electrical-generation fuels, industrial boiler and stationary heating fuels, and petrochemical feedstocks.

If the price of oil remains within a range where oil, natural gas, and coal effectively compete for industrial sales in North America, Europe, and East Asia, many of the world's large energy consumers will find it worthwhile to install dual or multi-fuel capacity, expressly in order to take advantage of small shifts in relative prices. The ability of a large consuming sector to switch fuels rapidly in response

to changes in relative fuel prices or availability would preempt the perverse market behavior that has permitted small market shocks to explode into global crises. Multi-fuel consumers would simply let go of enough oil in a tight market, and absorb enough additional oil in a slack market, to avoid even the *illusion* of a physical shortage or surplus. The greater this demand-side flexibility becomes, the more modest will be the world's need for a supply side price-maker like the TRC, the less onerous will be the price-maker's task if one is still needed, and the less damage an incompetent or irresponsible price-maker will be able to cause.

11. The most stable and easily sustainable price range is probably on the order of $10 to $18 per barrel (in 1982 constant dollars), delivered to the world's major consuming regions.

Unlike pre-1973 prices, the $10-to-$18 price range is high enough to cover the cost of mining and transporting coal, *and burning it in an environmentally acceptable fashion*, almost but not quite everywhere in the world. These prices are also high enough to justify shipping liquefied natural gas (LNG) from any low-cost gas-producing area near tidewater to almost any port in the world, and to justify building transcontinental natural-gas pipelines (though maybe not the Alaska or Yamal pipelines). Prices in this range would still leave oil holding a significant fraction of the markets for electric-utility and industrial boiler fuels and for petrochemical feedstocks. Any price excursion outside of this range, however, would still carry the threat of prices sharply fluctuating farther away from, or substantially overshooting, any attainable equilibrium.

History offers some empirical support for the viability of a long-term world oil price in the $10-to-$18 range. Over 110 years of crude-oil price records in the United States, the average price in 1982 dollars has been almost exactly $13 per barrel and, despite an average constant-dollar price fluctuation of more than 20 percent per year, no long-term trend can be detected. (The average 1982-dollar price between 1871 and 1925 was $12.96 per barrel, and the average price between 1926 and 1980 was $13.04 per barrel.) Thus, the *safest* guess as to the *average* crude-oil price over (say) the next 25 years may be about $13 per barrel in 1982 dollars. However—

12. These generalizations do not warrant a forecast of a $13 price, or any other specific price at any specific future time.

In the absence of a secure mechanism for getting world oil prices into this range and keeping them there for several years, and in the absence of a competent and responsible successor to the Texas Railroad Commission, the prospect is for wide and unforeseeable fluctuations in world oil prices like those that occurred before the TRC took control in the mid-1930s. The managing director of Royal Dutch Shell, D. deBruyne, summarized the new outlook well when he wrote that "we are in for a period of severe and unpredictable discontinuities."[19] The most ambitious forecast we dare make with any confidence is that—without some new market-ordering mechanism, which is not now in sight—

13. World oil prices will fluctuate both randomly and cyclically. In any given future year, however, the most likely price will be far below 1979-1982 levels.

In summary, there is no basis in geology, resource-economics, or history for predicting a never-ending increase in the real price of oil. Private investments and governmental institutions founded on that proposition are sure losers.

NOTES

[1]None of the several recent price forecasts I have seen, prepared for *internal* use by major petroleum producers (corporations or governments), expects sustained growth in the real price of oil during the rest of this century. All of them now assume continued constant-dollar price declines through at least 1985. At least two major integrated oil companies that now assume for their own planning purposes that the long-term oil price trend will fall somewhere *between a level nominal-dollar and a level constant-dollar trajectory*, released *public* forecasts in 1982 that still show long-term real-price increases for oil.

More significant than what the companies are saying, however, is what they are doing.

The dramatic change in industry's long-term oil price expectations over the last 2 years is impossible to ignore: the companies have scuttled every major unsubsidized synthetic-fuels project in North America, and most of the subsidized ones to boot. Oil companies are cutting back massively on drilling programs, but the most telling indicator of the drastic change in their expectations is the fact that *they are now paying only about half as much per barrel for proved petroleum reserves* as they were paying in late 1980. (On the last point, see B.F. Picchi, "The Valuation of U.S. Petroleum Reserves: Exploding the Myths" in Salomon Brothers, Inc. Stock Research/Industry Analysis, October 15, 1982.)

The change in the energy market did not take everyone by surprise. For early warnings in Alaska or from Alaskans about the impending turndown in oil prices and state revenues, see my remarks in the minutes of the U.S. Department of Commerce Economic Advisory Board during 1979 and 1980; also A.R. Tussing, "The 1981 Oil Price Outlook" in *The Economic Outlook for 1981*, University of Michigan, November 1980; A.R. Tussing, "Will Oil Prices Keep Rising? Maybe Not," *Anchorage Daily News*, February 14, 1981; Jon Matthews, "State Revenues Likely Will Drop: Oil Prices are Heading Down," *Anchorage Daily News*, May 29, 1981; A.R. Tussing, "Alpetco's Collapse Has Lessons for Budget Planners," *Anchorage Daily News*, May 23, 1981; Bob Shallit,

"State Faces Revenue Loss, Economists Say," *Anchorage Daily News*, January 15, 1982; "Alaska Cuts Forecasts," January 18, 1982; Erickson & Associates for the Alaska State Legislature, *The World Oil Market and Alaska State Revenues: A Fifteen-Month Forecast* (Juneau: March 1982).

[2]Alaska Department of Revenue, Division of Petroleum Revenue, *Petroleum Production Revenue Forecast*: (Quarterly, Anchorage: June 1980 through September 1982). In June 1982 the Department of Revenue's oil price forecasts were revised slightly upward. In September, however, the Department issued a forecast which in the long term is even more pessimistic regarding state oil revenues than the March report.

[3]Alaska Department of Revenue, Division of Petroleum Revenue, *Petroleum Production Revenue Forecast*, March 1982, p. 5.

[4]Charles Logsdon, Chief Petroleum Economist, Alaska Department of Revenue, personal communication to G.K. Erickson, July 18, 1982. When the Department of Revenue reduced the figures in each of the series of forecasts that corresponded to a specific confidence level, greater attention to the uncertainty of petroleum price forecasts led the department to emphasize its "30-percent" rather than its "50-percent" series. The different percentage figures indicate the Department's judgment about the probability that actual revenues will be *less* than the figure shown.

[5]" 'OPEC Will Survive,' Oilman Hammer says." Associated Press story in *Seattle Post-Intelligencer*, July 12, 1982, p. B8.

[6]Acres American, Inc. (the principal contractor on the feasibility study for the Susitna River hydroelectric project) offered the following list of "major forecasts of oil price trends" in order to refute forecasts of declining oil prices in another ISER report (A.R. Tussing and G.K. Erickson, *Alaska Energy Planning Studies: A review of three consultant studies submitted to Alaska state agencies in fiscal-year 1982*. Anchorage: ISER. Final report November 1, 1982):

Source	Date of Forecast	Forecast Trend (%)
Data Resources, Inc.	Summer 1982	+2.8
Int'nl Energy Agency	Spring 1982	—0.5 to + 2.0
U.S. DOE Energy Info Adm.	Spring 1982	above + 3.0
Canada: Energy Mines & Res.	Summer 1982	+ 1.7
Ontario Hydro	Spring 1982	+ 1.8
Energy Modeling Forum Avg. of ten models	February 1982	+ 1.9 to + 5.3
Dr. F. Fesharaki	Spring 1982	+ 1.7

From Alaska Power Authority, *Susitna Hydroelectric Project*, "Commentary on 'Alaska Energy Planning Studies' (A.R. Tussing and G.K. Erickson)," prepared by Acres American, Inc., September 7, 1982.

While the Acres compilation does not reveal the time span of the projections cited, it is representative of the kind of forecasting institutions that Acres polled, even in late 1982. Significantly, however, this list does not contain a single petroleum-producing company, financial institution, or agency of an oil-*exporting* political entity (see note 1), while four (half) of the forecasts cited come from governmental entities that have a powerful institutional stake (as does the Alaska Power Authority) in perpetuating the belief that real oil prices will continue to rise.

The published forecasts of government agencies and the big consulting firms indeed seem to be among the last to recognize the changed outlook, just as they were among the last to recognize that the high prices established in 1973-74 would be with us for a while.

[7]For the history of oil conservation and the rise of the Texas Railroad Commission, see Wallace F. Lovejoy and Paul T. Homan, *Economic Aspects of Oil Conservation regulation*, (Baltimore: The Johns Hopkins University Press, 1967), pp. 33-57, and Stephen L. McDonald, *Petroleum Conservation in the United States: An Economic Analysis* (Baltimore: The Johns Hopkins University Press, 1971), pp. 29-55.

[8]From the July 1882 *Scientific American*:

> The history of the discoveries in the Pennsylvania oil fields has been one of a series of disappointments to the producers. From 1866 to 1872 the price per barrel averaged from $4 to $5, and the producers were making money rapidly. Then the field in Butler County was struck, and from that day to this the production has been greater than the consumption. Then came the Bullion pool with its 2,000- and 3,000-barrel wells, which forced the price down to $1.50. This field was soon exhausted, and better times for the producers were at hand when the Bradford field, the largest in extent ever known, was opened. Then Bradford began to decline and again a silver lining was seen, but again disappointment came.
>
> In May of last year the first well was struck in Allegany County, New York, and a new field was opened that soon more than made up for the decline. Then was the great "646" well struck, and with it followed disaster to the owners of wells generally, and lower-priced oil than since the summer of 1874, when for a time it sold for 45 cents a barrel. Where the next field will be is only a matter of conjecture.

[9]For the history of import controls, including the influence of the Texas Railroad Commission on import policy, see M.A. Adelman, *The World Petroleum Market* (Baltimore: The Johns Hopkins University Press, 1972), pp. 150-154.

[10]Lovejoy and Homan, *Economic Aspects* . . ., pp. 265-285, and the Cabinet Task Force on Oil Import Control, *The Oil Import Question* (Washington: U.S. Government Printing Office, 1970), pp. 24, 121, 216, 242-246.

[11]Adelman, . . . *World Petroleum* . . . For a history of oil prices during the entire era, see pp. 131-191.

[12]M.A. Adelman, "Coping with Supply Insecurity," *The Energy Journal*, October 1982, pp. 1-16.

[13]On the role and operation of spot markets, see Paul H. Frankel, *Topical Problems* (London: Petroleum Economics, Ltd.), July/August 1973, p. xx; January/ February 1976, p. iv; and June 1979, pp. xvii-xviii.

[14]Estimated proved reserves as of January 1, 1982, can be found in Robert J. Enright, "Worldwide Report," *Oil and Gas Journal*, December 28, 1981, p. 86. The *Journal* lists Saudi Arabia's proved reserves as 164.6 billion. John Blair in *The Control of Oil* (New York: Vantage, 1978), pp. 18-19, quotes Yamani as saying that "Saudi Arabia's 'true reserves' are more than two and a half times the 'ultra conservative numbers' at which 'proved reserves' were being carried."

In 1972, James Akins, then U.S. Ambassador to Saudi Arabia, told Senator Mike Gravel and me that Saudi Arabia's reserves were "realistically" at least 700 billion barrels and "probably closer to a trillion." At a Central Intelligence Agency briefing I attended in 1975, an Agency spokesman gave almost the same estimates (likely from a common source) of the ultimate reserves in the known fields in Saudi Arabia. He added that Iraq's reserves were probably "almost as big."

For our present purposes it doesn't matter which of these reserve estimates is the most realistic; even the most conservative of them implies that Saudi Arabia is physically capable of producing considerably more than 20 million barrels per day without any new discoveries.

[15]See, for example, the remarks of Jahangir Amuzegar, Iranian Ambassador-at-Large and sometime petroleum minister, at a 1975 Salomon Brothers conference in London (World Petroleum: The Economics of Current Pricing and Supply Policies. London: Salbro Press, 1976, p. 30):

> Notwithstanding Western calculations and projections to the contrary, OPEC members believe that their oil reserves underground will be worth more in the future compared to the present—even with accumulated returns on the invested revenues.

Adelman makes a plausible case that this notion is

economically fallacious and, by implication, cynical and deliberately misleading (M.A. Adelman, "OPEC as a Cartel" in Griffin and Teece, *OPEC Behavior and World Oil Prices*, pp. 38-53).

However, Adelman's argument that oil reserves *never* earned as much as financial investments rests on discount rates that reflect the short life expectancies of Third World governments. This approach ignores the *ideological* content of national policy. Economic policy in most OPEC nations is either made by nationalist bureaucrats who view their nations as something *different from* the present government, or by heads of state who believe that their persons are *identical with* the nation, which is itself immortal. Either case results in lower discount rates and longer amortization periods than Adelman assumes for a non-ideological world.

Adelman's analysis also virtually dismisses the *specific* ideological role played by the concept of oil reserves as a long-term investment. OPEC spokesmen were doubtless sincere when they insisted that the asset-value of their resources was appreciating at a higher rate than the real rate of return on risk-free financial investments. My ground for accepting such professions at face value stems both from personal contact with high-placed and lowly believers, and the fact that it was in the oil exporters' interest that they and their customers both believe their motives were something more honorable than greed and their production scheduling built on something more substantial than simple opportunism.

My remarks at the same 1975 conference (A.R. Tussing, discussant, comments on speeches by Chief M.O. Feyide, Secretary-General of OPEC; Amuzegar; T.O. Enders, U.S. Assistant Secretary of State for Economic Affairs; Adelman; and P.T. Frankel, Director of Petroelum Economics, Ltd., *Topical Problems*, pp. 41-44) directly addressed Amuzegar's 1975 argument and anticipated Adelman's 1981 argument:

> To Karl Marx, who gave us the concept, "ideology" was a body of doctrine that provided a religious, moral, or scientific cloak to self-interest. Ideology is in the first place a political weapon: if they believe in it, its sponsors can draw from it moral fervor and confidence of success. And an effective ideology can also captivate or neutralize its adversaries. Believing one's own propaganda uncritically (or that of one's opponents) has, however, led to some remarkable foolishness, as various crusades from the Middle Ages to Vietnam have shown.
>
> I suppose that my message today is not to take OPEC's rhetoric too seriously, nor the opposing rhetoric. . . . The conservationist element in OPEC doctrine deserves more serious attention (than its profession of solidarity with the poor and exploited everywhere), particularly as it is a notion shared by a rich, industrialized non-OPEC oil producer like Canada and by a variety of environmentalists and Malthusian doomsayers in all of the rich countries. The common theme of all these parties is that mankind ought to keep its cheapest energy source, petroleum, in the ground because it will be more valuable in the future than it is today.
>
> This proposition cannot be dismissed out of hand. There may well be *some* producing country or countries with reserves of only ten to fifteen times current production, without the hope of major new discoveries and with only limited opportunities for productive investment at home. Such a country could reasonably estimate the so-called user cost of its petroleum —the present value of future production given up by producing today—to be as great or greater than the current world price. Such a country might reasonably believe, in other words, that its oil could appreciate in value over the average life of its reserves at a higher rate than the rate of earnings on risk-free foreign investment. Or it may believe that the risks—market and political—of all foreign investments are so great that they make speculation in oil inventories at home a more prudent investment.
>
> I am not certain there is such a country—*but that country surely is not Iran or Venezuela*, whose ability to absorb foreign exchange in profitable domestic investment ventures is insatiable, *nor is it Saudi Arabia*, whose potential reserves are so huge that the present value of a barrel of oil not produced today is truly negligible.
>
> No, to each of these countries, imiting production is rational *not* because its oil will be more valuable in the future but because *less production means higher prices today. Conservation, however, sounds more noble in the producers' own ears than maximization of monopoly profit*, and it appeals to a fashionable intellectual current in the rich consuming nations. The conservationist rhetoric is, therefore, a particularly effective ideological weapon of the cartel (emphasis added).

We need not be overly skeptical about the OPEC nations' belief in a doctrine that helped enrich them, when the same doctrine was believed by so many statesmen and scholars (including the majority of "energy economists") in Europe and America, who used it to rationalize policies that helped impoverish their own nations.

[16]As late as September 1980, it was possible for Cambridge economist Nicholas Kaldor to write seriously that, " . . . OPEC changed everything. By cornering oil it managed to increase the price fourfold, then double it again, and presumably it could be doubled again, *without any really serious impact on consumption.*" (Emphasis added. From "The Energy Issues" in T. Barker and V. Brailovsky, *Oil or Industry*: edited proceedings of Conference on Policy Issues in Energy Self-Sufficient Economies at Different Stages of Industrialization, held at Oaxaca, Mexico in September 1980. London: Academic Press, 1981, p. 3).

[17]Youssef M. Ibrahim, "Saudi Role in OPEC Under Siege" in *The Wall Street Journal*, July 21, 1982, p. 33.

[18]"Oil Nation Warns its Partners," Associated Press story in the Seattle *Post-Intelligencer*, July 8, 1982, p. B9. On Saudi Arabia's threats, see *Platt's Oilgram*, July 13, 1982, p. 1A.

[19]D. deBruyne, quoted in *Petroleum Intelligence Weekly*, June 14, 1982, p. 8.

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ALASKA
REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH, FEBRUARY 1983, Vol. XX, No. 1

Sustainable Spending Levels from Alaska State Revenues

INTRODUCTION

In November 1982 the citizens of Alaska, fearing that state government was growing out of control, passed a referendum limiting state spending. This spending limit, which will become law in fiscal year 1984, puts a ceiling on the state budget and limits its growth to changes in population and prices. The initiative sponsors felt that limiting the growth of state spending would eliminate the problems associated with an overwhelming dependence on the soon-to-be-depleted tax base of Prudhoe Bay petroleum.

However, falling world oil prices during the past 18 months and an anticipation of stable prices for the next several years, have rapidly reduced, if not eliminated, whatever effectiveness the spending limit may have had in holding the level of spending below total revenues. The state, therefore, knowing that the current revenue level is derived largely from a dwindling tax base and cannot be sustained, must again address the question of how best to limit spending of current revenues.

This *Review* demonstrates that the spending limit as presently structured will be ineffective in either (1) producing savings out of current revenues

Shortly after the state began collecting revenues from production of Prudhoe Bay oil, an issue of the *Review* entitled "Alaska's Revenue Forecasts and Expenditure Options" (1978) showed that the then-prevailing trend in the growth of state spending would result in a current account deficit in 1989 and the elimination of the general and permanent fund balances by 1993. That *Review* laid out the policy options available to the state for dealing with the eventual decline in petroleum revenues.

Between 1979 and 1981, estimates of expected petroleum revenues increased dramatically, primarily because of the increase in oil prices. State spending for existing and new programs correspondingly increased, causing the state to become even more dependent on oil revenues for the support of government programs and the provision of jobs in the private sector than in 1978. Thus, despite dramatic oil price increases since 1978, the fiscal outlook for the state has not improved; in fact, unless new spending policies are enacted, it will have worsened.

In illustrating Alaska's dependence on oil, the following tabulation shows that no other state economy comes close to being as petroleum dependent as Alaska:

Percent of State Revenues Provided Directly by Petroleum

	Severance Taxes, Rents, Royalties	Corporate Petroleum Property Tax	Total
Texas (1978)	19.6	NA	NA
Louisiana (1978)	29.2	NA	NA
Oklahoma (1978)	15.0	NA	NA
Alaska (1982)	66.8	19.7	86.5

NA: Not available.

This dependence upon petroleum revenues is of particular concern due to the projections of falling revenues which have become the pattern in the last year. This *Review* re-examines long-run state spending options in light of changing conditions affecting state revenues and expenditures. It discusses the implications of the newly passed spending limit initiative, contrasting it with a sustainable spending limit and, in so doing, demonstrates the range of spending options available to the state as petroleum revenues decline.

ALASKA REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

VOL. XX, No. 1, February 1983

Published by

Institute of Social and Economic Research
University of Alaska
Anchorage • Fairbanks • Juneau

Jay Barton–President, University of Alaska
E. Lee Gorsuch–Director, Institute of Social and Economic Research

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Editorial Assistant: K. Lee Crowe
907-278-4621

Main Institute Office:
707 "A" St., Suite 206
Anchorage, Alaska 99501

FEATURE

Scott Goldsmith — Sustainable Spending Levels from Alaska State Revenues

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or in (2) preventing a substantial long-term decline in government services and associated economic activity when oil revenues begin to fall. Since state expenditures must not exceed revenues over the whole cycle of petroleum extraction, it is the level of petroleum revenues measured over this cycle which should guide the establishment of a spending limit. Because petroleum revenues will decline in the next decade, even with new discoveries, a spending policy which will avoid severe budget reductions in the future must allow for the current investment of substantial revenues to cushion the decline. Consequently, the amount of future spending which can be supported depends not on an arbitrarily established limit, but on future petroleum revenues and a policy for current savings and investment.

After reviewing revenues from petroleum and other traditional and potential sources, this *Review* examines the future effects of the spending limit voted into law in 1982. It clearly demonstrates that because the limit is not based on anticipated levels of revenues and will not produce any significant savings or investment, it will not work. Indeed, it cannot work because revenues in the next few years will just about equal the current limit, and in later years will fall substantially short.

If the current spending limit will not work, then what, if anything, will? The author suggests an alternative spending rule based upon sustainable revenues. Specifically, his proposed limit would base allowable spending upon the sum of renewable revenues plus the annual real earnings of state assets. Under this rule, after an initial downward adjustment, state expenditures would be insulated from the decline in petroleum revenues. This rule would require both a substantial cutback in the state budget to approximately $1.5 billion and a large ongoing program of savings and investment of petroleum revenues over and above those currently flowing into the Permanent Fund.

The present spending limit and the proposed alternative set the bounds within which future state spending may occur. Contrasting the two clearly demonstrates the tradeoff Alaskans face when current spending exceeds the level which can be sustained in the long run.

ALASKA STATE REVENUES

For reasons set forth below, Alaska petroleum revenues will peak in the late 1980s and steadily decline throughout the 1990s. This will cause an accelerating loss of revenue and by the end of the decade pose a serious fiscal crisis, the solution to which must be reached within the next few years.

Petroleum

Revenues collected by Alaska state and local governments come overwhelmingly from the production of crude oil. Between 1977, the initial year of production from the Prudhoe Bay field on the North Slope, and 1982, petroleum revenues rose from 54 percent to 87 percent of total state general fund revenues. In recent years, transfers from the state general fund have become an increasingly important element of local revenues. Consequently, petroleum revenues support a large portion of local government as well as state government activity.

About 95 percent of Alaska crude oil production in recent years has come from a single "super giant" field[1] —the Prudhoe Bay field on Alaska's North Slope. This field ranks as the twelfth largest field ever discovered in the world and the largest ever discovered in North America (Table 1). The 10 billion barrels of recoverable oil at Prudhoe Bay make it a super giant. By comparison, only two other fields discovered in the United States—East Texas and Wilmington—initially held recoverable reserves in excess of 2 billion barrels. Except for these two, more oil has been removed from the Prudhoe Bay field during its first 4.5 years of production than any other North American field.

The Cook Inlet basin has accounted for the remainder of Alaska crude oil production since statehood. Production levels since statehood from Cook Inlet and Prudhoe Bay are shown graphically in Figure 1. Soon after the Prudhoe Bay field began production in 1977, the state production total jumped over 600 percent. Nearly 1 billion barrels of oil have been produced from Cook Inlet in the 23 years between statehood and the end of 1981. It now takes less than 2 years to produce the same amount of oil from Prudhoe Bay.

Less dramatic than the increase in total production in the late 1970s, but just as important, has been the decline in production from the Cook Inlet basin during the same period. This decline reflects the fact that every oil province follows a foreseeable cycle of growth, peak, and eventual decline. In 1981, Cook Inlet production had declined to 40 percent of its peak attained in 1970.

This pattern of growth, stabilization, and decline in annual production is characteristic of petroleum-producing areas as well as individual fields. It can be

[1] A "giant" oil field in North America is defined as containing at least 100 million barrels of recoverable oil. Although giant oil fields contain about 75 percent of all reserves, they are relatively rare because only about 1 percent of fields are large enough to be classified as giants. Yet, the "super giant" Prudhoe Bay field is 100 times larger than a giant.

Table 1

Prudhoe Bay Oil Field in Perspective

A. World's Largest Oil Fields

Name	Location	Size (Billions of Barrels)
Burgan	Kuwait	68.980
Ghawar	Saudi Arabia	60.278
Safania	Saudi Arabia	17.851
Kirkuk	Iraq	16.320
Samotlokskoye	USSR	14.600
Romashkino	USSR	14.040
Rumaila	Iraq	13.835
Gachsaran	Iran	11.435
Marun	Iran	10.887
Lagunillas	Venezuela	10.782
Agha Jari	Iran	10.084
Prudhoe Bay	USA	10.014

B. North America's Largest Oil Fields

Name	Location	Size (Billions of Barrels)
Prudhoe Bay	USA	10.014
Chiapas	Mexico	6.513
East Texas	USA	5.999
Wilmington	USA	2.418
Poza Rica	Mexico	2.028
Pembina	Canada	1.742
Midway Sunset	USA	1.683
Yates	USA	1.600
Wasson	USA	1.508
Kern River	USA	1.453
Panhandle	USA	1.415
Swan Hills	Canada	1.315
Ebano-Panuco	Mexico	1.304
Sho-Vel-Tum	USA	1.300
Elk Hills	USA	1.296
Naranjos Cerro Azul	Mexico	1.177
Huntington Beach	USA	1.076
Santa Ynez	USA	1.000

Source: "The Search Goes on for Giant Fields," *Oil and Gas Journal*, August 1977, p. 102. Since this table was compiled, significant discoveries made in Mexico have increased the estimated ultimately recoverable reserves from some fields. One field, Chicontepec, could rival Prudhoe Bay in size, but there is some controversy over the official Pemex estimate of its recoverable reserves of 10.96 billion barrels. See "World Oil Flow Slumps, Reserves Up," *Oil and Gas Journal*, December 29, 1980, pp. 75-82; and "Giant Chicontepec Given 42 Percent of Mexican Oil Reserves," *Oil and Gas Journal*, August 20, 1979, pp. 82-85.

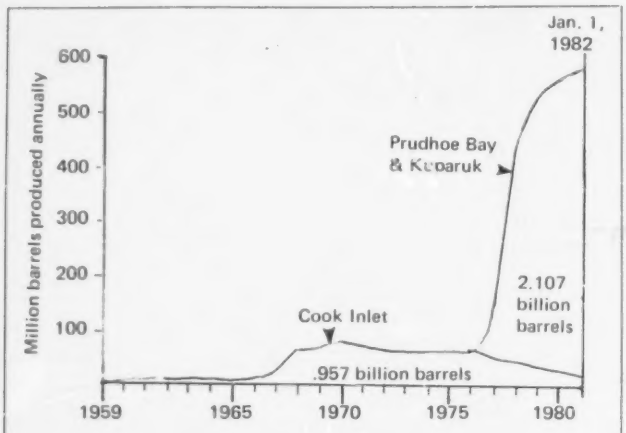


Figure 1. Historical Production from Alaskan Oil Fields

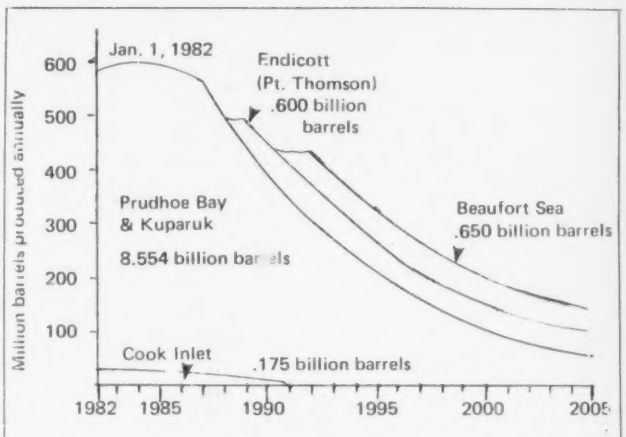


Figure 2. Projected Production from Proved Alaskan Oil Reserves

identified in every major oil-producing state. Texas, which has historically had the highest production rate of any state, by 1981 was producing at about 73 percent of the post-World War II peak it reached in 1972. Oklahoma is producing at 70 percent of its peak. In Louisiana, current production is now only about 48 percent of its peak. In Kansas and New Mexico the percentages are 53 percent and 55 percent, respectively. The same pattern holds in the other major producing states, except for California, which in 1981 surpassed its previous peak year of 1968 by 2 percent.

Because one supergiant field overwhelmingly dominates current Alaska production, the eventual production decline may be more abrupt in Alaska than elsewhere. Based upon current levels of proved reserves, including (in addition to Prudhoe Bay) Kuparuk, Endicott (Point Thomson), and state leases in the Beaufort Sea as well as Cook Inlet, the production peak will occur in the mid-1980s, and the subsequent decline will be rapid. This is illustrated in Figure 2, which projects through 2005 oil production from proved reserves in Alaska.

This projection illustrates two important points. First, Prudhoe Bay production will fall to one-third of its current level in little more than 10 years. Second, the introduction of proved reserves from new fields such as Kuparuk (which, at 1.125 billion barrels, is itself a large "giant" by North American standards) will have only a modest impact on either the number of years over which peak production can continue or the subsequent slope of the decline in aggregate oil production. Both are dominated by the absolute size of Prudhoe Bay. Thus, a field containing an estimated 600 million barrels of reserves, such as Endicott (Point Thomson), will provide only enough oil to fill the Alyeska pipeline for one year, or to postpone the production decline by one year.

We underestimate ultimate recoverable reserves by basing projections upon estimates of proved and probable reserves on currently leased state lands because the process of exploration and development is ongoing in the relatively unexplored Alaska frontier regions. Proved reserves are, in a sense, only the current inventory of the oil industry. Additions to that inventory continuously occur through exploration and development which both bring new fields into production and increase the ultimate production of existing fields.

A crude oil inventory including proved reserves and an estimate of recoverable undiscovered resources is shown in Table 2. As of January 1, 1982, proved reserves were 8.729 billion barrels, located mostly on the North Slope at Prudhoe Bay and Kuparuk, both of which are now producing. Additional state lands (Endicott and the Beaufort Sea) which are currently under lease and where exploration activity is ongoing are estimated to contain 1.250 billion barrels. These areas are also on the North Slope. Estimates of potential reserves in areas of the state currently not yet leased, both onshore and offshore, are speculative in nature. The most recent estimate for these unexplored regions is 21.5 billion barrels, the majority of which is estimated to be on federal lands on the North Slope or offshore in the Beaufort Sea.

Long Lead Time for New Discoveries

The amount of oil which will be discovered and ultimately produced from these regions depends upon the expected cost of field development in relation to the expected market price of the oil, both of which must be estimated many years into the future because

Table 2

Alaskan Crude Oil Resources Inventory

	Billion Barrels
Cumulative Production since 1959 (Jan. 1, 1982)	3.064
Prudhoe Bay	2.107
Cook Inlet	.957
Proved Reserves[a] (Jan. 1, 1982)	8.729
Prudhoe Bay	7.429
Kuparuk	1.125
Cook Inlet	.175
Probable Reserves on Currently Leased State Lands[a] (July 1982)	1.250
Endicott (Point Thomson)	.600
Beaufort Sea	.650
Economic Undiscovered Resources[b] (Dec. 1981)	21.5
North Slope onshore	2.1
Beaufort Shelf	8.2
Arctic National Wildlife Refuge	2.3
National Petroleum Reserve Alaska	2.1
Central Chukchi Shelf	1.6
Navarin Basin Shelf	2.3
St. George Basin	1.1
Bristol Basin	.6
Norton Basin	.3
Onshore South of Brooks Range & Offshore South of Aleutian Chain	.9

[a]State of Alaska, Department of Natural Resources, Proved and Probable Oil and Gas Reserves, North Slope, Alaska, July 1982.

[b]National Petroleum Council, *U.S. Arctic Oil and Gas*, December 1981 was utilized for estimates north of Aleutian Chain offshore and north of the Brooks Range onshore. Economic undiscovered oil was based upon an economic evaluation of recoverable reserves using a 10 percent real rate of return, p. 89. Other Alaska reserves were taken from U.S. Department of the Interior, U.S. Geological Survey, 1981.

of the very long lead times required for field development in the Arctic, estimated to be 10 to 15 years. Consequently, although it is safe to say that production from currently undeveloped fields will occur, it is impossible to project when it will occur and in what volumes. Smaller fields, fields requiring new technologies, and fields farther from existing pipelines will be more expensive to develop than Prudhoe Bay. Some discoveries may remain undeveloped if the costs are too high, even though they may be "giant" fields. The pace at which future discoveries are converted into production will slow down as more frontier provinces are explored. Consequently, the oil industry agrees that continued exploration and production from new fields will be unlikely to close the gap left by the decline of Prudhoe Bay production. Exploration chief Roger Hererra of the Sohio Alaska Petroleum Company, in discussing the decline in Prudhoe Bay production beginning after 1988, has stated, "We would need to find a new field each year to make up the difference . . . That's not very likely, and that's when the crunch may come." [2]

Importance of Oil Field Location

State revenues from petroleum also depend upon where that petroleum is located. Currently, virtually all proved reserves of crude oil lie under state lands. From this production, the state receives a royalty share and collects taxes on production and profits. In addition, it taxes petroleum-related property. Table 2 shows that most of the oil yet to be discovered is believed to lie onshore under federal lands or offshore under the outer continental shelf. Although the state will be able to tax petroleum production, property, and profits on federal onshore lands, it will receive only a share of the federal royalties earned. Offshore, beyond the 3-mile limit, the state has no taxing authority and will collect no royalties. Property taxation of shore-based exploration, development, and production facilities is currently the only method by which the state could collect revenues from outer continental shelf production. As a result, the state will be receiving a smaller share of the revenues from the development of most new fields.

The state's exact share is impossible to estimate accurately since the "rules of the game" for dividing the profits are always changing. Experience in dividing the profits from Prudhoe Bay production suggests that there will be continuing negotiations among the parties [3] over the distribution of profit shares, because the reward for changing the allocation formula is so great.[4] Consequently, it may be misleading to try to predict future revenues under current distribution rules. It is safe to say, however, that the oil compan-

[2]Alaska Growth Policy Council, 1981 Report to the Governor, p.24.

[3]In the case of Prudhoe Bay, the federal government, state government, local governments, and the oil companies.

[4]Rewriting the corporate income tax law, placing a ceiling on the severance tax, etc.

ies and federal government will not be predisposed to change the rules governing the sharing of outer continental shelf revenues to favor the state of Alaska.

In summary, nearly all Alaska production and revenues come from the single largest "super giant" field ever discovered in North America. A decline in production from this field will begin in 5 years and continue into the next century. Production from proved reserves in other fields and new discoveries will not be sufficient to fill the gap left by the declining Prudhoe Bay production. The decline in state revenues will proceed more rapidly than the production decline because a large portion of new reserves is likely to be located on the federally controlled outer continental shelf where the state has no taxing authority.

Petroleum as a Nonrecurring Tax Base

Prudhoe Bay oil can appropriately be viewed as an asset worth $36 billion in 1982 dollars.[5] *At current rates of expenditure, Alaska is rapidly depleting this asset, and it has no equivalent asset to meet future needs.*

The preceding analysis suggests that the overwhelming dominance of crude oil production in the Alaska tax base is a transitory phenomenon. If one element of the state's tax base is nonrecurrent, it should be explicitly identified as such and revenues derived from that base treated differently from recurring revenues from a permanent tax base.

State oil revenues are proceeds from the sale of a part of the state's tax base—the state government's tax and royalty "share" of the oil. Of the five major categories of petroleum revenues, lease bonuses and royalty income most clearly represent the sale of a state asset. The other three revenue sources—the severance tax, the corporate income tax, and the property tax on oil and gas production and transportation-related property represent taxation of a nonrenewable resource. The state will receive these revenues only as long as oil is being produced and sold. In contrast, most other industries do not depend on a dwindling resource base. For them, current production does not preclude future production; they can generate a continuous flow of revenues from a continuous level of production. In the oil industry, however, if reserves are produced today, they will not be available as a tax base in the future.

[5]When comparing the value of any asset at different points in time, the use of nominal dollars not corrected for inflation can yield very misleading results. Consequently, in the text of this report, all figures are presented in 1982 dollars unless specifically identified otherwise.

Petroleum as a Capital Asset

Oil in the ground, therefore, particularly in such unusually large and likely unique fields as Prudhoe Bay, represents a capital asset owned by the state, similar to money in the general fund, state-owned land, or a state-owned office building. A rough estimate of the value of this capital asset can be calculated by multiplying the proved reserves of oil (at the start of the fiscal year) by the current per-barrel level of petroleum revenues. Thus, if as was true at the beginning of the 1983 fiscal year (July 1, 1982), there were 7.007 billion barrels of proved reserves of oil in the ground at Prudhoe Bay, and the current per-barrel state revenue from all petroleum taxes and royalties was $5.40, then the value of the state's share of the oil in the ground at that time was $37.838 billion (Table 3).

This estimate entails two simplifying assumptions. First, we assume that real per-barrel revenues in future years will be the same as they are today. Second, we assume that there is no discounting of those revenues which will not be collected until some future year. Inflation aside, a dollar received today is worth more than a dollar received in the future, because the dollar received today can be invested to earn a positive return, and consequently will be worth more than one dollar next year. To compare a dollar received in the future with a dollar received today, we must discount the future dollar by the earning potential of the dollar invested today. The discounted value is that amount which one would be willing to pay today in return for receiving a dollar at some time in the future. Banks, businesses, and individuals commonly apply discount rates to future revenue streams based on their investment opportunities, and the state should do the same. If the state can earn an average 2 percent annually (after accounting for inflation), then the future petroleum revenue stream should be discounted at that rate. This reduces the present value of the Prudhoe Bay tax base at the start of the 1983 fiscal year to about $31 billion, which represents the value today of the future stream of revenues the state will receive.

Changing Value of State's Share

The value of the state's share of the oil in the ground at Prudhoe Bay changes annually because (1) oil is being withdrawn from the field at the rate of 547 million barrels per year, (2) the real market value of oil fluctuates, (3) tax law modifications change the per-barrel tax liability, and (4) inflation changes the price of oil. The combination of these factors has caused the value of Prudhoe Bay oil in the ground to vary dramatically from year to year.

Table 3

Value to the State of Oil in the Ground at Prudhoe Bay

Fiscal Year (ending in calendar year)	Initial Oil in Place (billion (barrels)	Production (billion barrels)	Production Related Petroleum Revenues (billion $) (Current $)	(1982 $)	State Revenues per Barrel (Current $)	(1982 $)	Undiscounted Value to the State of Oil in the Ground at Prudhoe Bay (billion $) (Current $)	(1982 $)
1978	9.356	.314	.630	.892	2.01	2.84	18.806	26.650
1979	9.042	.433	.979	1.259	2.26	2.91	20.435	26.288
1980	8.609	.508	2.141	2.499	4.21	4.92	36.244	42.311
1981	8.101	.547	2.914	3.126	5.33	5.71	43.178	46.325
1982	7.554	.547	3.998	3.998	7.30	7.30	55.144	55.144
1983 (est.)	7.007	.547	2.956	2.763	5.40	5.05	37.838	35.362
1984 (est.)	6.460	.547	3.010	2.629	5.50	4.81	35.530	31.033

Source: Oil in Place from Alaska Oil and Gas Conservation Commission, *Statistical Report*, annual, converted to fiscal year basis, Prudhoe Bay field only.
State Revenues per Barrel is calculated as total production related petroleum revenues including Permanent Fund contributions and ANCSA payments (Royalty, Severance Tax, Property Tax, Oil and Gas Income Tax from Alaska Department of Revenue, *Revenue Sources*, annual) divided by annual production. The reserves tax is netted out of 1977 and the credit added into 1978 and 1979. These figures are a slight overestimate since they include Cook Inlet Oil Revenues. Bonuses are not included for 1980.
Value of state share of Prudhoe Bay oil is calculated as oil in place multiplied by per barrel tax revenues.
Anchorage consumer price index for 1982 assumed to be 265. Inflation from 1982 to 1984 assumed to be 7 percent annually.

The components of the year-to-year change in the asset value of Prudhoe Bay oil are presented individually in Table 4. At the start of each year, the initial value is determined as the product of quantity in place and average per barrel revenues. As the market price for oil fluctuates and the laws change, average per-barrel revenues increase or decline. This changes the value of oil in place (inventories). Over the course of the year, oil is withdrawn from the field; this generates revenues for the state. These revenues can be divided into the sale of assets and the conversion of assets. The sale of assets is that portion of petroleum revenues which goes into the general fund and is subsequently spent. Conversion of assets consists of that portion of petroleum revenues which is converted into a different form of asset—either physical or financial capital.

Looking at year-to-year changes in the real asset value of Prudhoe Bay oil in the ground, we see that holding wealth in the form of oil was a good investment from 1978 until late 1981 because, in spite of the annual withdrawal of 547 million barrels, the real value of oil in the ground grew from $28.96 billion in 1978 to $59.17 billion in 1981. Since then, however, the reverse has been true. The asset value of the state share of Prudhoe Bay oil fell by more than 20 billion dollars between 1981 and 1982 to $37.84 billion. This is primarily the result of a fall in per-barrel revenues from $7.30 to $5.05. In 1983, the value of the oil will decline by more than $2 billion, primarily because of the withdrawal of 547 million barrels from the field.

Prudhoe Bay oil is not the only component of state wealth. Other assets consist of natural resources on state lands and in state waters, both renewable and nonrenewable; and capital, both physical and financial. The monetary value of each asset in the state portfolio is equal to the present value of the future revenues expected to flow from it. The value of the state's natural resources and physical capital is not currently known. On the other hand, the value of the financial capital of the state is equal to its current balance. The Alaska Permanent Fund and the state general fund are the main elements of state financial capital. The net worth of semi-autonomous state agencies such as the Alaska Housing Finance Corporation and the Alaska Power Authority represent another element of the financial wealth of the state.

Table 4 includes the conversion of petroleum assets into financial assets in the Permanent Fund. This underestimates total asset conversion and overestimates the sale of oil in the ground because it does not show conversions to resources which do not have readily quantifiable values—such as the net worth of public agencies and additions to physical capital. However, it is clear that in each year since production began at Prudhoe Bay, the conversion of petroleum assets into alternative assets of readily identifiable value has been modest. In the early years,

Table 4

Components of Change in Undiscounted Value to the State of Oil in the Ground at Prudhoe Bay
Billion $

	Fiscal Year (ending in)						
	1978	1979	1980	1981	1982	1983	1984
Value of Oil in Ground (July 1)							
Current $	18.806	20.435	36.244	43.178	55.144	37.838	35.530
1982 $	26.650	26.288	42.311	46.325	55.144	35.362	31.033
Add: Change in Value of Inventories[a]							
Current $	2.259	16.788	9.074	14.880	−13.326	.648	NA
1982 $	3.201	21.596	10.593	15.966	−13.326	.606	NA
Deduct: Total Sale & Conversion of Assets (Petroleum Revenues)							
Current $	.630	.979	2.140[b]	2.914	3.980	2.956	3.010
1982 $	.893	1.259	2.498	3.126	3.980	2.763	2.629
Net Sales of Assets[c]							
Current $	.580	.895	1.910	1.629	2.771	2.317	NA
1982 $	.822	1.151	2.229	1.748	2.771	2.165	NA
Conversion of Assets[d] (Contributions to Permanent Fund)							
Current $	.050	.084	.230[b]	1.285	1.209	.639	.326
1982 $	.071	.108	.269	1.379	1.209	.597	.285
Equals: Value of Oil in Ground (June 30)							
Current $	20.435	36.244	43.178	55.144	37.838	35.530	NA
1982 $	28.959	46.625	50.406	59.170	37.838	33.206	NA

[a]Change in value of reserves due to changes in both crude oil market price and state tax laws (calculated as the residual of year-end value plus sales and conversions minus year start value).

[b]Lease sale bonus revenues not included.

[c]Total petroleum revenues net of Permanent Fund contributions.

[d]$4 million contributed to the Permanent Fund in fiscal year 1977 is not included here. Includes the amounts transferred in 1981 through 1983 under the special appropriations made in 1981 and 1982.

Source: Petroleum revenues consist of royalties, severance taxes, property taxes, and oil and gas income tax including Permanent Fund contributions and ANCSA payments. The reserves tax is netted out of 1977 and added into 1978 and 1979 figures. Petroleum revenues are on a fiscal year basis.

transfers into the Permanent Fund averaged less than 10 percent of petroleum revenues. When special Permanent Fund appropriations were made in fiscal years 1981, 1982, and 1983, the conversion to financial assets still averaged only 32 percent of petroleum revenues.

Historical Fluctuation in State Wealth

By defining state wealth to include both the state's share of oil in the ground at Prudhoe Bay and the balance in the Alaska Permanent Fund, we can trace the historical fluctuation in total state wealth (Table 5). We see that in 1978, the combined value of these two assets was $29.035 billion, essentially all in the form of oil in the ground. In January 1983, state wealth was estimated to be $36.585 billion, with the proportion held in the Alaska Permanent Fund close to 10 percent. The growth of the Permanent Fund balance has been dramatic. When viewed in dollars corrected for inflation, however, we see that, absent further special appropriations to the Permanent Fund, its real value will increase much more slowly in future years. If nominal earnings are withdrawn from the Permanent Fund, a substantial portion of

new, regular fund contributions will be required just to maintain the real value of the fund.[6] Assuming withdrawal of all earnings, the Permanent Fund balance is estimated to increase by only $64 million in 1982 dollars between 1983 and 1984 in spite of a contribution of $285 million over that period. Most of the fund contribution will be needed just to offset inflation which continuously erodes the real value of the Permanent Fund balance.

The Recurring Tax Base

Recurring state revenues are miniscule compared to current levels of state spending and cannot be realistically viewed as an answer to the state's impending fiscal crisis, unless a radically new approach is taken to the savings and investment of current state revenues.

State general fund revenues can be divided into six categories—four major and two minor. The first two—the sale of assets and income from investments—relate primarily to petroleum and have already been discussed. Recurring revenues collected from individuals and businesses constitute the other two major categories. The personal and corporate income taxes have historically been the most important of these recurring revenues. A small proportion of general fund revenues comes from the two remaining sources —federal transfers and user fees. Federal transfers are usually restricted to particular purposes such as capital investments for transportation and health projects or transfers to individuals. Ferry system receipts constitute the largest revenue in the category of user fees, which also includes court fees.

Table 6 presents a historical review of recurring state revenues in relation to nonrecurring petroleum revenues and investment earnings. Business revenues consist of the corporate income and gross receipts tax as well as business licenses. Revenues from individuals are defined as nonbusiness taxes plus nonbusiness licenses. The miscellaneous category includes both federal shared revenues and user fees as well as other small categories of government receipts.

In the current fiscal year of 1983, fully 86 percent of revenues are directly from nonrecurring petroleum activity; 7 percent of general fund revenues come from recurring revenues not directly related to petroleum. An equal proportion is contributed by investment earnings. However, most of the reported Permanent Fund earnings are more appropriately classified as the sale of an asset since earnings are calculated before inflation. The real earnings are just

[6]Under current law, a portion of Permanent Fund earnings must be retained for the purpose of capital preservation. This increases the estimated growth in the Permanent Fund balance. Current interpretation of the law, however, appears to define retained earnings as net of distribution of 50 percent of the fund earnings under the Permanent Fund dividend program. Consequently, at historical inflation rates, the real value of the fund will still decline without continuous large contributions.

Table 5

Combined Asset Value: Undiscounted State Share of Prudhoe Bay and Alaska Permanent Fund
(In billions of 1982 $)

	Fiscal Year (ending in calendar year)						
	1978	1979	1980	1981	1982	1983	1984
July 1. Assets							
Oil in Ground	$26.650	$26.288	$42.311	$46.325	$55.144	$35.362	$31.033
Perm. Fund Bal.	.006	.069	.161	.518	1.768	2.782	3.158
Total	$26.656	$26.357	$42.472	$46.843	$56.912	$38.144	$34.192
Change in Assets							
Oil in Ground	$2.309	$20.337	$8.095	$12.845	$–17.306	$–2.156	NA
Perm. Fund Bal.	.071	.108	.403*	1.379	1.209	.587	.285
Total	$2.380	$20.445	$8.498	$14.224	$–16.097	$–1.839	NA
June 30. Assets							
Oil in Ground	$28.959	$46.625	$50.406	$59.170	$37.838	$33.206	NA
Perm. Fund Bal.	.076	.178	.564	1.897	2.977	3.379	3.443
Total	$29.035	$46.803	$50.970	$61.067	$40.815	$36.585	NA

Note: All Permanent Fund earnings (nominal as well as real) transferred to General Fund.
*Includes proceeds of $114 million from Beaufort Lease Sale.

Table 6

Sources of State Revenues
(millions of 1982 dollars)

	UNRESTRICTED GENERAL FUND REVENUES											CONVERSION OF ASSETS	
	Total[a]		Business[b] Revenues	Individual[c]	Misc.[d]	Investment Earnings		Petroleum Revenues			TOTAL PETROLEUM		
Year	(Nominal $)	1982 $	(non-oil)	Revenues	Revenues	Before Inflation	After Inflation[e]	Total	Sale of Assets	Conversion of Assets[f]	REVENUES[g]	Petroleum Revenues[h]	Gross Fund Withdrawals[j]
1974	$255	$512	$54	$150	$66	$83	$21	$159	$159	$0	$159	$0	$62
1975	333	584	71	213	78	68	17	154	154	0	154	0	51
1976	710	1,154	106	312	56	52	13	628	628	0	628	0	39
1977	874	1,331	122	381	55	53	13	720	720	0	726	6	40
1978	787	1,115	116	266	61	63	16	609	609	0	680	71	47
1979	1,179	1,516	109	203	75	76	19	1,053	1,053	0	1,161	108	57
1980	2,633	3,073	67	167	69	140	35	2,630	2,630	0	3,032	402	105
1981	3,718	3,989	88	43	74	244	61	3,540	2,573	967	3,952	1,379	183
1982 (pre.)	4,105	4,105	91	55	80	323	81	3,556	2,756	800	3,965	1,209	242
1983 (est.)	3,444	3,220	86	51	85	220	55	2,778	2,498	280	3,095	597	165
1984 (est.)	3,212	2,804	85	49	69	87	NA	2,514	2,514	0	2,789	285	NA
1985 (est.)	3,243	2,647	85	48	66	82	NA	2,366	2,366	0	NA	NA	NA

[a]Includes Native Land Claims payments in 1978 through 1980. In 1984 and 1985 Permanent Fund dividends not included in general fund revenues.

[b]Corporate income tax, gross receipts tax, business licenses.

[c]Non-business taxes, non-business licenses.

[d]Federal shared revenues, state resource revenues excluding petroleum (composed primarily of ferry charges, miscellaneous user fees, and sales of state property).

[e]General fund and permanent fund earnings net of amounts required to maintain real value of these funds. We assume that, due to inflation, 75 percent of nominal earnings is necessary to maintain asset value.

[f]Special Permanent Fund contributions.

[g]Including mandatory Permanent Fund contributions.

[h]Total Permanent Fund contributions.

[j]General and Permanent Fund earnings before inflation minus earnings after inflation. (This ignores general fund deposits in some years which may have an offsetting effect.)

Source: Alaska Department of Revenue, *Revenue Sources*, annual.

a small portion of the nominal return.

In contrast, almost 53 percent of revenues in 1974 were collected from individuals, nonpetroleum businesses, and miscellaneous sources. Over the last several years, primarily because of the elimination of the personal income tax, there has been a dramatic fall in both the real amount as well as the percentage of revenues derived from individuals, and this has occurred at a time of rapid population and income growth. In 1983, only an estimated $51 million will be collected from individuals, compared with $381 million as recently as 1977. Similarly, there has been a decline in real revenues from non-oil-related business, but it has not been as precipitous as the decline in individual revenues. Whereas taxes and other revenues collected from individuals were more than double those collected from non-oil businesses in 1977, non-oil business receipts were almost double those of individuals by the early 1980s. The expansion of investment earnings during this period has only partially offset the decline in revenues from individuals and non-oil businesses. After correcting for inflation, we find that real investment earnings remain a modest source of revenues.

Future Revenues: Actual and Potential

Even if Alaska's personal income tax is reinstated and its corporate tax rate increased, Alaska's revenue gap—the difference between projected revenues and state expenditures under the current spending limit—will approach $1 billion by 1991.

Figure 3 shows a projection of future revenues based upon likely petroleum production (including natural gas) from leased areas as well as current trends in recurring (individual, non-oil business, and miscellaneous) general fund revenues. A revenue gap appears in 1989 at about the time production from Prudhoe Bay begins to decline. Revenues then fall during each succeeding year. Neither investment earnings nor business, individual, or miscellaneous revenues will be large enough by 1990 to offset the fall in petroleum revenues.

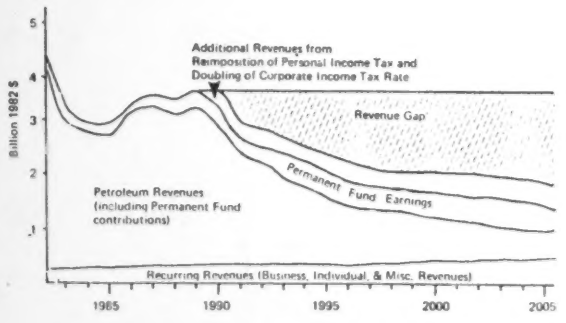


Figure 3. Projected State Revenues: General Plus Permanent Fund

Several strategies have been suggested for dealing with this projected revenue gap:

1. **Increase the flow of petroleum revenues.** This could result from raising the per-barrel tax rate or increasing production on state lands. However, tax increases could only temporarily compensate for declining production and could accelerate it. To fully replace the revenue which the state will lose from the decline in the Prudhoe Bay field would require development of a new field on state lands every year. We have shown, and all knowledgeable sources agree, that this is virtually impossible.

2. **Rely on the development of nonpetroleum natural resources.** Comparing the value of natural resource industry outputs in Alaska indicates that no alternatives could expand enough in a few years to generate the level of sales necessary to provide a tax base comparable to petroleum (Table 7). In 1981, petroleum (crude oil plus natural gas) accounted for 92.5 percent of natural resource sales; seafood contributed 5.9 percent. All others combined totaled only 1.6 percent.

   For example, just to match the value of petroleum output, the fishing industry would need to expand 1,600 percent. Profitability in the industry would also need to increase. The resource base will not allow this.

   Alternatively, coal, of which Alaska has large reserves, is often suggested as a successor to petroleum. Many deposits are not now economically attractive because of their location, but fields such as the Beluga and Nenana have a definite potential for development and expansion during the coming decade. If the state royalty and related taxes were to total $1 per ton of coal (which is higher than current state revenues per ton of coal produced), then an annual production of 4 billion tons would be required to equal the nearly $4 billion in petroleum revenues collected by the state in fiscal year 1982. Four billion tons is about 4,000 times current production and is also approximately the total demonstrated reserves in these fields.[7]

[7]Alaska Department of Natural Resources, Open File Report, No. 51, 1975.

Table 7

Market Value of Unprocessed Alaska Natural Resources: 1981

	Million $	Percentage
Crude Oil	$12,396	91.9%
Seafood	792	5.9
Timber	120	.9
Natural Gas	83	.6
Gold	54	.4
Coal	18	.1
Agriculture	12	.1
Furs	6	.1
Other Minerals	4	
Total	$13,485	100%

Note: Petroleum value calculated at wellhead. All others calculated at Alaska market price.

Source: Crude oil, natural gas, and gold from Division of Budget and Management, Office of the Governor, *Alaska Statistical Review*, 1982. Coal, other minerals, furs, timber, estimated by author by extrapolation. Seafood from Alaska Department of Fish and Game (preliminary). Agriculture from *Alaska Agricultural Statistics*, 1982.

Thus, it would be physically impossible to generate the same amount of revenues from coal as from oil. Development of the coal industry may produce a stable number of jobs and a flow of revenues, but it cannot replace the magnitude of revenues generated by petroleum.

3. **Rely on downstream processing of, or value added to, Alaskan resources.** Currently, revenues from such downstream processing are primarily obtained from the corporate income tax. At current tax rates, the corporate tax base would need to grow to over 100 times its current size to replace the revenues from petroleum in 1982.

4. **Reimpose the personal income tax and increase corporate tax rates.** Reimposing the personal income tax and doubling the corporate income tax rate would increase individual and business taxes only modestly, as shown in Figure 4. This strategy would fill the revenue gap for only one year and would subsequently reduce it by only a small percentage.

Clearly, no one of these strategies is capable of filling the gap. In addition, adopting all of them would likely yield revenues no higher than those estimated to result from increased taxation of income, because tax increases tend to restrict the growth of the tax base. The revenue gap thus presents the state with a difficult choice regarding future expenditures. On the one hand, the revenue gap can be ignored. This would mean adjusting to continuously declining revenues beginning in 5 years. On the other hand, investment strategies using a portion of current revenues could be devised to provide a future stream of earnings to replace declining petroleum revenues.

THE SPENDING LIMIT

By 1988, state revenues will fall below the state spending limit and set the stage for a run on the state's accumulated surpluses, including the Permanent Fund.

Beginning with the fiscal year 1984 budget, the state will limit expenditures by placing a ceiling on appropriations which changes from year to year with population and inflation. The ceiling, established at $2.5 billion for the base fiscal year 1982, exempts only debt service, Permanent Fund dividend payments, voter-approved capital expenditures, and supplementary Permanent Fund appropriations. The limit also specifies that at least 33 percent of appropriations must be allocated to capital expenditures and loans.

The spending limit of $2.5 billion will not be a real constraint on appropriations in any future year because general fund revenues are projected to at most equal or fall short of allowable spending under the formula limit every year (Figure 4). This projec-

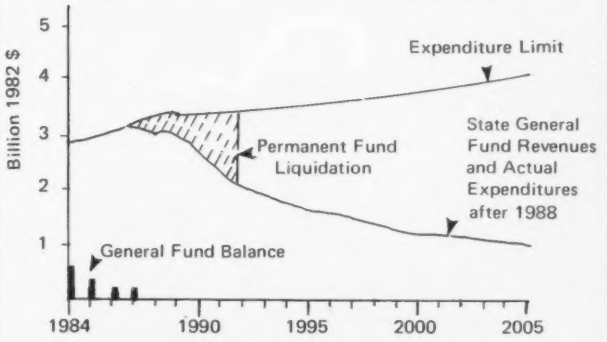


Figure 4. State Fiscal Situation: $2.5 billion Constitutional Spending Limit*

*The expenditure limit grows in constant 1982 dollars due to population growth which is projected at the rate of 2 percent annually. Without population growth, the expenditure limit ceiling would be a flat line.

tion is based upon the assumptions summarized in Table 8.[8] Spending up to the limit can occur during the first 4 years, beginning in FY 1984, only by drawing upon the accumulated balances in the general fund. Rather than generating savings by limiting spending, the limit permits the liquidation of the modest general fund balance.

By 1988, the spending limit ceiling will have become ineffective because the rising ceiling will have surpassed revenues. By 1991, revenues will have fallen $1 billion below the limit, and in subsequent years, the revenue gap will continuously increase (Figure 5). By 1995 it will equal $2 billion—half the level of 1982 revenues. Although the growth of this gap between spending and revenues will subsequently slow down, in 10 more years it will still reach $3 billion. This gap represents the amount of revenues that would be required from new sources to keep state spending up to the ceiling defined by the limit formula.

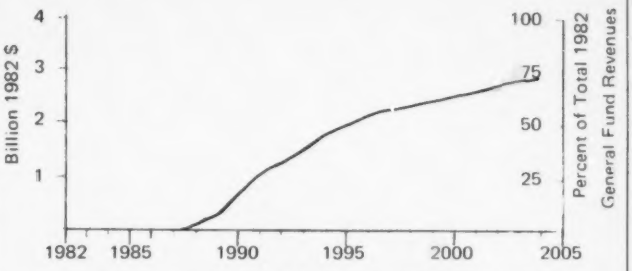


Figure 5. Revenues From New Sources Necessary to Fill Revenue Gap Under Spending Limit

The Permanent Fund is the only financial asset which the state could draw upon to fill the revenue gap created by falling revenues and a growing spending limit ceiling. When revenues fall below the ceiling, however, the Permanent Fund balance will be about $4.5 billion, a modest amount because of the annual

[8]The projection also assumes that oil and gas exploration, development, and production remain important basic activities, and growth occurs in fish harvesting and processing, mining, timber, manufacturing, and tourism. The state budget is divided as follows: capital spending is assumed to be one-third of the total and to be divided equally between construction projects and subsidies to housing and industry. All capital expenditures are paid from the general fund. Consequently, the only expenditure items not covered by the ceiling consist of Permanent Fund dividends at the rate of one-half of nominal Permanent Fund earnings and debt service payments which decline each year as outstanding bonds are paid off. The Permanent Fund receives its constitutionally mandated share of petroleum royalties and bonus payments, while all other excess current account revenues remain in the general fund where they earn interest until spent.

Table 8

Principal Assumptions of Projections

STATE REVENUES	
Petroleum	
Royalties	Approximate Dept. of Revenue, Dec. 1982, 50% probability forecast with 2% annual decline after 1998.
Severance Tax	Approximate Dept. of Revenue, Dec. 1982, 50% probability forecast with 2% annual decline after 1998.
Corporate Tax	20% of severance tax.
Property Tax	Dept. of Revenue, June 1982 forecast with 4% annual growth after 1984.
Bonuses	Zero.
Recurring Revenues	
All Revenues determined by MAP econometric model at currently existing tax rates.	
RETURN ON INVESTMENT	
Real rate of return on general fund balances	2% annually.
Real rate of return on Permanent Fund balance	3% annually.
SPENDING LIMIT	
Inflation	7.4 percent long-run average annual rate.
Population	2 percent annual growth.

Royalties and severance taxes are the June 1982 30-percent probability forecast of the Department of Revenue. The undiscounted sum of petroleum revenues as projected by the Department of Revenue were 8 percent lower in September 1982 than in June and are expected to be again lower in December. Thus, we estimate the 30-percent probability forecast of June to approximate the December 50-percent probability forecast.

withdrawal of both real and nominal earnings to fund the Permanent Fund dividend program and to supplement general fund revenues.[9] Because of these withdrawals, the real value of the accumulated balance in the Permanent Fund (before annual contributions) will have been eroding about 7.4 percent annually (the inflation rate), and contributions from royalties and bonuses equal to 7.4 percent of the accumulated balance will be necessary each year just to keep abreast of inflation.

Although the Alaska constitution prohibits withdrawal of principal from the Permanent Fund, the emergence of a revenue gap would generate tremendous pressure to open it up. If the Permanent Fund were opened at this time to maintain spending levels, it would be completely spent within 4 years. At the end of that time, the state would find itself with no sources of funds with which to replace falling revenues, and state expenditures would have to be cut sharply and abruptly.

The spending limit will not serve to avoid a revenue gap because it will ineffectively restrict spending in the early years. It establishes no framework for determining the proper levels of investment out of petroleum revenues and, consequently, will generate an insufficient level of recurrent earnings from investment. The major asset the state will have as revenues fall is the Permanent Fund, the earnings and principal of which will be insufficient to fill the gap for long.

Figure 6 shows that with the present spending limit in place, the assets of the state, defined as the sum of oil in the ground plus the Permanent Fund, will rapidly dissipate. (Other assets such as home mortgages are not included because we have no information on the current or projected state holdings of these assets. Regardless, even a portfolio of these assets worth $5 billion would not significantly alter the picture.) Petroleum cannot be converted to other forms of wealth quickly enough under the present spending limit to maintain the asset portfolio from which earnings are generated. Thus, as the state portfolio declines, so will asset earnings.

In the coming years, public sector demands for providing basic services in education, health, social services, resource management, public protection, and transportation will continue to grow with the economy and real incomes. However, by the end of the century only about $1 billion annually (1982 dollars) will be available to fund all government programs. The cutbacks required to live within a $1 billion budget constraint will be drastic and will undoubtedly eliminate many programs considered necessities.[10]

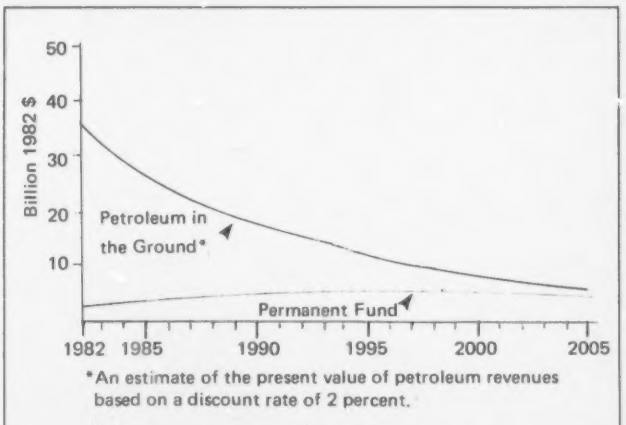


Figure 6. Portfolio of Public Wealth

A second consequence of a cutback in state spending will be a large economic contraction, resulting from decreased government spending in the economy. Currently, operating budget appropriations are used to pay the wages and salaries of over 15,000 state government employees as well as support a large number of the 24,000 local government employees through various local revenue transfer programs. Thus, about one in six of the 200,000 jobs in the state economy directly result from state operating appropriations. In addition, the capital budget directly provides employment to a significant portion of the construction industry. Also, the Permanent Fund dividend program and state loan programs pump income into the economy on a scale similar to the payroll of a major industry like construction or manufacturing. Overall, about one-third of current personal income can be traced, directly or indirectly, to state government spending. Like other industries, state spending has a "multiplier" effect in the trade, service, finance, and other support sector industries of the state. A forced reduction in spending would cause a contraction of private support sector activity because the "multiplier" works in a negative as well as in a positive direction.

A more optimistic projection of petroleum revenues does not appreciably alter our conclusions. This becomes evident when we compare the accumulated balance in the general fund in 1988 under present

[9]Reinvestment of Permanent Fund earnings would only marginally change the conclusions.

[10]Future expenditure flexibility is further limited by the spending limit requirement that at least one-third of appropriations be for capital projects, about twice the historical proportion. The operation and maintenance of this new capital stock will place added demands on shrinking revenues in future years.

revenue projections with higher revenue projections. Under current projections, the general fund balance in 1988 would be $68 million. A 20-percent increase in petroleum revenues (an approximate increase from $20 to $25 billion in nominal dollars) would result in the accumulation of $2.4 billion (in 1982 dollars) in the general fund. This would fill the revenue gap until 1992.[11]

By lowering the spending limit ceiling, we can reduce and delay the revenue gap but not eliminate it. If the initial ceiling were set at $1.5 billion, state expenditures would more closely balance with revenues (Figure 7). The state would be able to sustain a surplus on current account in the general fund through 1995. Through the accumulation and investment of these surpluses, the general fund would grow dramatically to a peak of $8 billion (1982 dollars) by 1992.[12] In this case, when the decline in petroleum revenues reduced current account revenues below the expenditure limit, the general fund balance could be used to cover the revenue gap and sustain spending. Withdrawals would not exhaust the general fund until 2003. At this point there would again be tremendous pressure to open up the Permanent Fund, despite a state constitutional prohibition. If the state were to withdraw from the Permanent Fund, its balance would be used up in about 4 years. Thereafter, the state would again be facing a revenue gap with no means of filling it.

The lower spending limit would help the state to both live within its means and accumulate a fund which could be drawn upon to sustain spending for 10 years after petroleum revenues begin to decline. However, it would not eliminate the revenue gap problem, only postpone it. Because state spending under this limit would be allowed to grow more rapidly than nonpetroleum revenues, the growth of spending would eventually outstrip the growth of nonpetroleum revenues. This problem can be handled only by restructuring the spending limit.

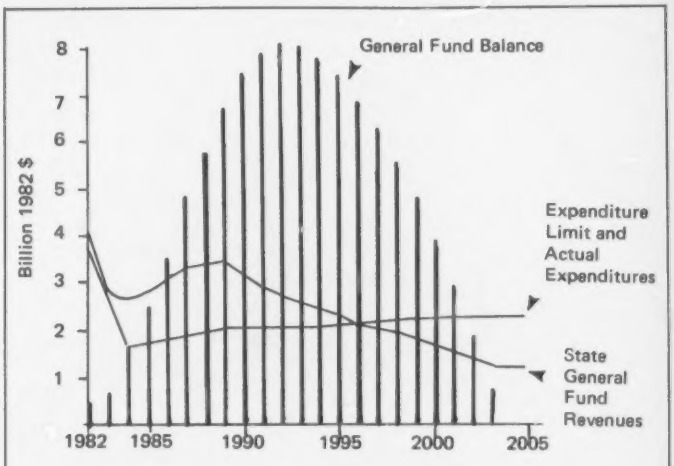


Figure 7. State Fiscal Situation: $1.5 billion Constitutional Limit

THE SUSTAINABLE STATE EXPENDITURE LEVEL

A spending rule that would hold annual appropriations at or below the level of sustainable revenues would allow the state to live within its means and avoid the future need for sharp and massive cuts in expenditures as oil revenues decline.

Because the current spending limit does not generate savings outside the Permanent Fund, public services must fall dramatically when petroleum revenues decline. Preferable therefore would be an alternative spending rule that prevents a precipitous decline in government spending with its attendant negative impact on the private sector. One possibility would be a level of spending that could be sustained in the future independent of year-to-year fluctuations in petroleum revenues.

A sustainable expenditure level is one which can be maintained at a constant or growing level in "real" terms (corrected for inflation) when petroleum revenues decline. It must incorporate two elements. First, each year a savings/investment decision must be made simultaneously with the spending decision rather than treating savings as the residual left after spending. In other words, spending each year should be guided by long-range fiscal considerations rather than by the amount of revenues available for the current year. Second, spending must not grow faster than recurring revenues—revenues independent of dwindling resources.

Implementing this strategy first requires that the level of sustainable revenues be calculated, because this will determine the sustainable spending level. Sustainable revenues consist of the sum of all recurring revenues[13] plus the earnings on the

[11] Which is approximately comparable to a movement from the 50-percent to 70-percent level of the cumulative frequency distribution of the Department of Revenue petroleum revenue forecasts.

[12] During the interval from 1993 to 1995, a positive general fund current account balance would be increasing the nominal value of the general fund balance, but not fast enough to offset the erosion of real value due to inflation.

[13] In practice, there is no clear distinction between a recurring and a nonrecurring revenue because, on the one hand, revenues

(Footnote 13 continued)

portfolio of state wealth. While it is relatively easy to estimate recurring revenues based upon past trends in nonpetroleum business and personal taxes as well as miscellaneous revenues, it is more complicated to estimate the value of the state portfolio of wealth. However, there is no doubt that it now consists primarily of Prudhoe Bay oil and the Permanent Fund balance (Table 5). The annual real return on these assets, which consists of a portion of annual petroleum revenues and real fund earnings, is the earnings on the state portfolio.

The real monetary earnings on the assets held by the state in 1982, both in the form of oil in the ground at Prudhoe Bay and in financial assets, totaled approximately $750 million. This was the earnings, at a 2.5 percent real rate of return, on assets with a present value of $30 billion. Recurrent revenues were about $450 million, including petroleum revenues from fields other than Prudhoe Bay. Thus, total sustainable revenues equaled about $1.2 billion.[14] In nominal dollars, this would be about $1.475 billion in 1984 (Table 9).

These revenues of $1.475 billion in 1984 would cover not only operating and capital expenditures, but also debt service and Permanent Fund distributions (which are outside the current spending limit). The difference between actual revenues collected and sustainable revenues spent under the limit would go into savings/investment for maintenance of the sustainable revenue level in future years. As the level of recurring revenues, inflation, and earnings on the portfolio of state assets changed, the spending limit ceiling would also change.

The result of implementing the sustainable spending strategy without reimposing the personal income tax is illustrated in Figure 8.[15] We assume that expenditures would gradually fall over a 3-year period from their current level to the sustainable limit, after which they would grow indefinitely with recurring revenues. State general fund spending would be less than general fund revenues from the initiation of this strategy until 2005. Each year, revenues in excess of recurring revenues would be saved and invested. We assume this savings would go into the general fund, although it could go into the Permanent Fund. In a short time, the general fund would grow larger than the Permanent Fund. Earnings from the general fund would become an increasingly important component of total revenues. After 1997, the general fund balance would begin to fall in real

Table 9

Calculating Sustainable Spending

A. Components of Annual Sustainable State Revenues (million 1982 $)

Recurring Revenues		$450
Recurring Petroleum (excluding Prudhoe Bay)	$250	
Current Nonpetroleum	200	
Investment Earnings (see below)		750
Total Sustainable Annual Revenue Flow		$1,200
Equals: Total Sustainable Annual Expenditures		$1,200
Total Sustainable Annual Expenditures (1984 fiscal year)		$1,475

B. Investment Earnings Matrix (million 1982 $)

Real Return on Investments	Present Value of State Investment Holdings (Prudhoe Bay plus Fund Balances) (billion 1982 $)					
	$10	$20	$30	$40	$50	$60
0%	$0	$0	$0	$0	$0	$0
1%	100	200	300	400	500	600
1.5%	150	300	450	600	750	900
2%	200	400	600	800	1,000	1,200
2.5%	250	500	750	1,000	1,250	1,500
3%	300	600	900	1,200	1,500	1,800
3.5%	350	700	1,050	1,400	1,750	2,100
4%	400	800	1,200	1,600	2,000	2,400

[13](Continued)
from depletable resources may continue for such a long time that they become, in effect, recurrent; and recurrent revenue sources may disappear with shifts in economic activity. The most obvious example of a dwindling revenue is the proceeds of a one-time bonus lease sale. Consequently, in this analysis, we treat Prudhoe Bay revenues as a one-time windfall that is dwindling and other petroleum revenues as well as all revenues from other sources as recurring. In fact, our analysis is relatively insensitive to a shift in the definition of other petroleum revenues between recurring and nonrecurring.

[14]Reimposing the personal income tax could raise this limit by about $200 million.

[15]We phase out the Permanent Fund dividend program, local government grants from the capital budget, and all loan subsidization over a period of three years through 1986. A downward adjustment of the economy occurs in 1984 in response to the imposition of the sustainable spending limit. Expenditure growth after 1984 is determined by the rate of inflation and by the absolute growth in recurring revenues. Because

[15](Continued)
recurring revenues are projected to grow slowly under current tax laws, the growth of expenditures is much slower than in the case of the spending limit formula.

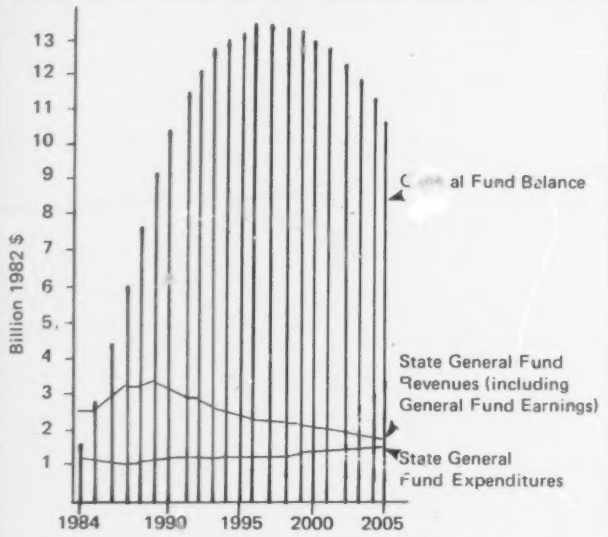
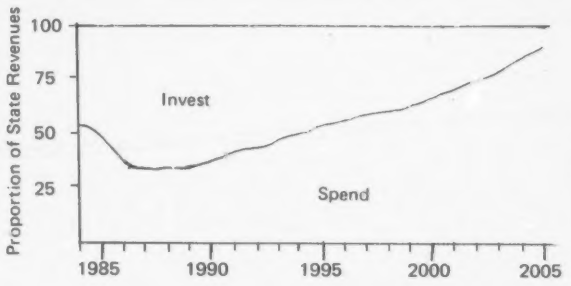


Figure 8. State Fiscal Pattern: Sustainable Spending Strategy



Note: Constitutionally mandated Permanent Fund contributions not included.

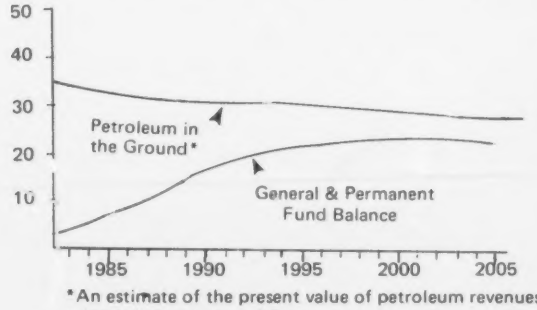
Figure 9. Proportions of General Fund Revenues Invested and Spent in Sustainable Spending Strategy

dollars, due to withdrawals, even though it continued to grow in nominal dollars. Because we assume in this case that Permanent Fund earnings would be reinvested until needed, the value of the fund would grow much more rapidly than in the previous examples. In 2005, the balance would be $12.1 billion rather than $5.3 billion (in the case where all earnings are withdrawn). Eventually, the real earnings of the Permanent Fund would become the main source of state revenues. At some point after 2000, as Prudhoe Bay petroleum revenues ran out, actual revenues would be no greater than sustainable revenues, and at that time, expenditures would be set to equal actual revenues.

This strategy provides both a savings and a spending formula. The savings and investment necessary to maintain the level of sustainable revenues in future years is the difference between actual revenues and sustainable revenues. The year-by-year allocation between spending and savings/ investment is shown graphically in Figure 9. In the early years, savings and investments, not including investments in the Permanent Fund, must be greater than spending if a sufficient asset base is to be built up to avoid the revenue gap.

The portfolio of public wealth would evolve over time, as shown in Figure 10. As the value of oil in the ground declined with extraction, it would be replaced by a growing value of financial capital in the form of the general and Permanent funds. Earnings from financial assets would replace petroleum revenues as the primary funding source for state government. This conversion plan and its maintenance would require a particular type of discipline and restraint. The state portfolio of assets would be composed of discretionary assets rather than the current nondiscretionary oil reserves; maintenance of the asset value would require considerable prudence and orientation to long-term needs.

After the initial expenditure adjustment, dramatic year-to-year variations in spending and the attendent dislocations could be eliminated under this plan. Recurring revenues change modestly from year to year. The earnings potential of assets in the state's portfolio would vary from year to year, for example, due to proceeds from a lease sale, from adjustments in the value of existing assets, or from an adjustment in the real rate of return on the portfolio. Although each of these factors could significantly affect earnings in the short run and create considerable uncertainty in the long run, prudence suggests using some combination of past values for these variables in



*An estimate of the present value of petroleum revenues using a discount rate of 2 percent.

Figure 10. Portfolio of Public Wealth: Sustainable Spending Strategy

estimating earnings from assets. This would smooth out any year-to-year variation.

The amount of sustainable spending in any year is primarily a function of three variables. They are (1) the real return on state assets, (2) the level of petroleum revenues, and (3) the level and growth of revenues from recurring sources.

The real return on state assets is the most important determinant of the sustainable spending level. This can be seen clearly in Table 9, part B, which shows, for various state portfolio levels and real rates of earnings, the annual contribution to sustainable spending (real earnings) from the asset portfolio. For example, we have assumed a real return of 2 percent on the general fund and 3 percent on the Permanent Fund, for a combined rate of approximately 2.5 percent. At this rate, a $30 billion portfolio would produce $750 million in sustainable spending annually. A change in the interest rate of .5 percent would change sustainable spending by $150 million.

About 90 percent of state assets are currently held as petroleum (Table 5). If the present value of petroleum revenues is double current estimates (the estimated December 1982 50-percent confidence level of the Department of Revenue), then annual spending of $1.5 billion rather than $750 million could be sustained from them, and the spending ceiling could be raised to $1.95 billion (1982 dollars). Smaller portfolios would produce smaller annual earnings.

When petroleum revenues are received is also important. The rate of return on oil in the ground is the increase in its value as its real price rises. Projections of petroleum revenues in past years assumed the real price at the wellhead to be rising about 2 percent annually. In such a case, the state would gain as much by holding its assets as oil in the ground as it would by holding them in the form of a financial asset earning a 2-percent real return. However, if the oil in the ground is not increasing in value each year, the state should prefer to hold its wealth in the form of a financial asset earning a 2-percent real annual return. Of course, the state has relatively little control over the timing of Prudhoe Bay oil production, but it must recognize that if it holds an asset which earns no positive rate of return, the present value of that asset is less; consequently, the level of sustainable revenues is less.

The sustainable spending strategy is independent of the rate of population growth, unlike the recently enacted spending limit. The advantage of this independence is that the revenue gap does not appear sooner if population growth accelerates as would be the case under the present spending limit. It is a disadvantage because government services are primarily provided to individuals, and a larger population requires a larger budget if it is to receive the same quality of public services.

The Investment Portfolio

Sustainable revenues from a state portfolio of investments are only possible if those assets generate a positive net flow of revenues into the general fund.

Implementation of a state spending strategy linked to sustainable revenues would require very substantial savings/investments over the next 10 years. Up to this point, for simplicity, we have analyzed that portfolio in terms of only two alternatives—oil in the ground and financial assets (the Permanent and general funds). In reality, there is a broad range of assets in which the state could invest. The primary consideration in any investment choice is the earning potential of the investment because sustainable revenues depend upon real positive earnings, as was demonstrated in Table 9.

To judge its appropriateness as an investment for generating sustainable revenues,[16] the rate of return on any asset—be it a natural resource or a piece of physical capital—can be measured against the return available on financial capital. For this purpose, the proper measure of the rate of return is the net flow of revenues into the general fund. For example, if general fund investments earn a 10-percent return (of which 8 percent is the result of inflation and 2 percent represents a real return on investment), then to be equivalent, a state investment of $1 billion in infrastructure would need to produce at least $20 million in recurring state tax revenues annually over and above operations, maintenance, and replacement costs. Accordingly, all state investments earning anything less represent a cost and should be viewed as such.

State investment policy may have objectives other than maximizing asset earnings, such as subsidizing certain activities or creating jobs. Without addressing the question of the most appropriate means for meeting these objectives, it is clear that a state portfolio consisting of such investments could not sustain the maximum flow of annual revenues.

Suppose, for example, that the state chose to invest the general fund in a portfolio of investments consisting of subsidized loans, earning a positive nominal but zero real rate of return. It would find

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[16]Public capital expenditures are normally made not to produce public revenues but to serve a public purpose. All such capital purchases are defined in this analysis as spending since they do not represent the creation of a revenue-producing asset.

that an otherwise sustainable spending level of $1.475 billion could not be maintained because the investment portfolio would return its initial value in inflated dollars but would provide no positive return and thus could contribute nothing to sustainable revenues.[17]

Figure 11 shows the combined balance in the general and Permanent funds at different real rates of return on fund balances with adoption of the sustainable spending strategy. If the portfolio of state investments were earning a below-market rate of return, fund withdrawals would reduce the portfolio value and the spending level would be found to have been set too high. In the extreme, if the real rate of return on the combined general and Permanent Fund balances were zero, then no sustainable revenues would be generated from the asset portfolio. Figure 11 shows that the danger of holding assets which generate no real earnings would not become apparent until the 1990s, when asset earnings would become the primary revenue source. During the 1980s, when the primary source of spending was petroleum revenues, which were unaffected by the level of financial earnings, the gap between the value of the portfolio at market rates and at subsidized rates would be small.

Policy Initiatives for Attaining Sustainable Spending

As recently as 1980, the state's budget was under the sustainable limit, and a rollback to that level would be easier today than the elimination of essential services in the future.

Figure 12 compares the pattern of future general fund spending under the current spending limit with

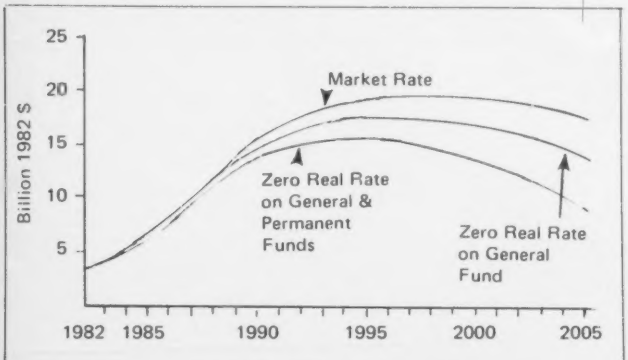

Figure 11. Combined Fund Balances Resulting from Different Rates of Return on State Asset Portfolio

[17] A further consideration is that the maturation dates on these investments would need to be chosen so that they could be liquidated in the sequence necessary to fund operations when petroleum revenues declined.

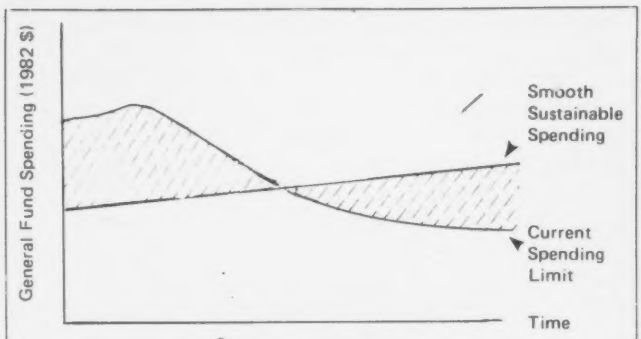

Figure 12. The Range of General Fund Spending Options

our sustainable spending alternative. These two alternatives define the range of options available for structuring state expenditures in future years.

The current spending limit allows considerably more spending in the near term and less in the future, as spending in early years is determined by the limit and in later years by declining revenues. With the sustainable spending strategy, however, spending starts lower and rises slowly over time as recurring revenues grow. Between these two extremes, a large number of alternatives is possible, representing different amounts of current savings consistent with increased spending in future years.

The tradeoff between present and future public spending implicit in the current spending limit is clearly illustrated. If spending in any year exceeds the sustainable level by, say, $1 billion, then in some future year spending must be under the sustainable limit by $1 billion. For example, if we choose a current $2.5 billion budget instead of a $1.5 billion one, then we must pay for that $1 billion difference with a future budget reduced from $1.5 billion to $0.5 billion. If on the other hand, we establish a sustainable baseline budget of $1.5 billion, then future budgets could continue at or above that level indefinitely.

Because the current budget contains many nonessential items, a one-time rollback in current government spending by $1 billion would be much easier to accomplish today than would annual budget reductions over a period of decades during the era of declining petroleum revenues. In fact, as recently as 1980, state spending was within the sustainable budget level, and it has been only in the last 3 years, primarily due to new programs, that appropriations have exceeded the sustainable level.

In the wake of higher oil prices which increased state revenues over 200 percent between 1979 and 1981, state spending expanded dramatically, and a

number of new programs were initiated. Precise figures for actual and projected spending for these programs are not yet available. Preliminary figures presented in Table 10 confirm, however, that the most rapid growth has not been in the traditional components of the budget, but rather in a series of newly instituted programs. The operating budget grew by 50 percent, from $1.2 billion to $1.8 billion between 1980 and 1982, and was level between 1982 and 1983. Personnel expenditures have grown less rapidly than either the operating or the total budget. In 1981 they comprised only 19 percent of expenditures (net of special Permanent Fund contributions) compared to 40 percent in 1971. In contrast, debt service expenditures grew more rapidly than the total operating budget.

The traditionally defined capital budget is currently about one-sixth the size of the operating budget—the same proportion it maintained in the early 1970s. Real capital expenditures grew slowly through the decade of the 1970s (excluding the 1979 appropriation for rural school construction) but expanded rapidly in response to higher oil revenues.

Permanent Fund contributions, both those constitutionally mandated at 25 percent of royalties and bonuses and the special appropriations in 1981, 1982, and 1983, have been the second most important use of state funds since 1980. (In addition, in 1982, $350 million was placed in a "rainy day" account within the general fund.)

There are three new components of the nonoperating budget. The largest consists of a number of newly established or greatly expanded loan programs, of which the housing mortgage loan program is the largest. Also included in this category are industrial development loan programs, such as the mining loan program and the Alaska Industrial Development Authority. Money allocated to these loan programs can be divided into two categories. A portion of the loan program appropriations represents long-term investments by the state on which a monetary return is expected. Because these loans are made at subsidized rates in order to stimulate certain activities, the return will, in general, be lower than the monetary return expected from funds held in the general fund or invested in the Permanent Fund. The remainder of the appropriations is for the operation of the loan programs and subsidies actually paid and, as such, does not represent an investment. No breakdown between investment and cost of program operation is currently available for these programs.

The second new component of the nonoperating budget consists of a large array of energy-related loans, grants, and transfers. The most important component of these programs is funding for hydroelectric projects throughout the state. As with the housing and other special loan programs, it is not possible to determine the proportions of these programs that are, respectively: investment, subsidy, and operations. The third element of the nonoperating budget is municipal grants for capital projects.

A spending rollback in the direction of a sustainable level would logically concentrate on the reduction of new programs instituted in the last three budgets. Their lower priority is clearly indicated by the fact that they did not exist in earlier years when revenues were lower and fewer programs could be funded. The reduction of some of these programs could be accomplished with relative ease. For example, loan programs for housing are less urgent when housing mortgage rates are falling as is currently the case. Capital expenditures for hydroelectric projects can end when all economically viable projects have been funded. This is not to say that budget cuts will be easy to make, even in cases where the program has served its purpose. Constituencies both in government and the private sector rapidly develop in support of any government program. Still, it is clear that significant rollbacks are possible, particularly in light of the size of the 1980 budget.

CONCLUSIONS

Future state revenues from petroleum may be more or less than have been projected in this analysis, and sustainable revenues, consequently, more or less. Whatever their level, there is a sustainable level of expenditures which, if exceeded, means program cuts will be necessary in future years. If current revenue projections are correct, eventual program cuts would be very large if the present spending limit continues to guide state fiscal policy.

Any discussion of the proper state response to declining petroleum revenues transcends economic considerations. There are at least two broader social questions. The first is, to what extent should the present generation of Alaskans worry about the fiscal problems which the next generation may inherit from us?[18] The more we think they should "fend for themselves," the more we feel we can afford to spend today. The projections in this study indicate, however, that the problems of the "next generation" are only a few years distant.

The second question is, what are the economic, social, and cultural implications of the state acting as a *rentier*[19]—a situation in which the public sector would live primarily off the earnings of the state's assets. There are no precedents for such a fiscal structure among the states. In this, Alaska would be breaking new ground.

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[18]Or, what is the proper rate at which to discount the future?

[19]One who derives a fixed income from returns on investments.

Table 10

Uses of State Revenues[a]
(millions of 1982 dollars)

	GENERAL FUND APPROPRIATIONS													PERMANENT FUND CONTRIBUTIONS[m]
	TOTAL			OPERATING BUDGET					NON-OPERATING BUDGET					
											New Programs[l]			
	Nominal $[b]	1982 $	Net of Special Perm. Fund Contributions[c]	Total[d]	Personnel[e]	Debt Service[f]	Permanent Fund Dividend[g]	Local Govt. Transfers[h]	Total[j]	Regular Capital Projects[k]	Housing & Business Loans	Energy Loans, Grants, Transfers	Local Govt. Capital Grants	
1971	$299	$701	$701	$610	$282	$35	–	$9	$91	$91	–	–	–	–
1972	314	717	717	649	325	44	–	27	68	68	–	–	–	–
1973	364	804	804	680	366	52	–	28	124	124	–	–	–	–
1974	374	751	751	729	378	53	–	28	22	22	–	–	–	–
1975	528	927	927	800	407	53	–	38	127	127	–	–	–	–
1976	627	1,020	1,020	928	410	57	–	45	92	92	–	–	–	–
1977	735	1,119	1,119	1,023	447	64	–	48	96	96	–	–	–	6
1978	834	1,182	1,182	1,064	481	71	–	45	118	118	–	–	–	41
1979	1,080	1,389	1,389	1,142	500	77	–	47	247	247	–	–	–	108
1980	1,135	1,325	1,325	1,208	534	88	–	53	117	117	–	–	–	402
1981 (pre.)	3,942	4,230	2,887	1,478	558	105	–	122	1,409	214	829	52	–	1,379
1982 (pre.)	4,663	4,663	3,863	1,810	NA	102	148	152	2,053	775	634	429	215	1,209
1983 (est.)	3,175	2,969	2,689	1,861	NA	132	260	127	828	341	299	94	94	597

[a]1981-1983 data estimated from final appropriations bill as well as *Executive Budget*. Data in different columns may be inconsistent beginning in 1981 because of different sources treating individual items differently.

[b]Office of the Governor, *Executive Budget* 1983, book 2, page 10. 1981 to 1983 from appropriations bills.

[c]Net of special permanent fund contributions in 1981 and 1982 and rainy-day account contributions in 1981.

[d]Office of the Governor, *Executive Budget*, annual, through 1981. Subsequent estimates from appropriations bills.

[e]Total personnel expenditures funded from all operating budget sources. Office of the Governor, *Executive Budget*, annual.

[f]Office of the Governor, *Executive Budget*, 1983, book 2, page 10.

[g]Funds originally appropriated in 1981 were not paid. Funds appropraited in 1982 were paid in 1983. 1983 estimate based upon $1,000 payment per capita.

[h]Sum of shared taxes, municipal assistance, and municipal revenue sharing. Office of the Governor, *Executive Budget*, annual through 1981. Subsequent estimates from appropriation bills.

[j]Total general fund appropriations minus operating budget through 1980. 1979 includes rural school construction appropraition of $141 million. 1981 total includes ANCSA payment of $314 million. Subsequent to 1980 is the sum of non-operating items.

[k]Through 1980 equal to total non-operating budget. Subsequent estimates from appropriations bills.

[l]Compiled from appropriations bills.

[m]Includes special contributions in 1981 and 1982.

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Established in 1961 by the Alaska Legislature, the Institute of Social and Economic Research operates as a principal research organization within the University of Alaska system. Since its early beginnings on the Fairbanks campus, ISER has developed into a full-scale economic and social science research institute, dedicated to applying its multi-disciplinary skills to the problems of social and economic change in Alaska. Presently headquartered in downtown Anchorage at 707 A Street, with offices in Fairbanks and Juneau, the institute now comprises a select staff of professionals, whose academic backgrounds and research experiences encompass a broad spectrum of professional disciplines and policy issues.

ISER investigates such issues as the economics of natural resource development, principally petroleum and fisheries, and multiple-use land management; the social and economic impacts of resource developments such as oil and gas pipelines, petrochemical facilities, and hydroelectric projects; the state's transportation and energy requirements; the development of human resources; and the effects of modernization on Alaska Native peoples and cultures and on the quality of life in Alaska.

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- *Provide professional assistance to public and private organizations to help meet socioeconomic needs of Alaska's population.* Staffmembers serve as advisors to or members of the Alaska Native Foundation, the Cook Inlet Native Foundation, the Women's Resource Center, the Alaska Permanent Fund, and the Alaska Census Advisory Committee.

- *Sponsor discussion of public issues.* Examples: the Alaska Growth Policy Symposium, the Alaska Constitutional Review (both co-sponsored by the Alaska Humanities Forum), and the Alaska Science Conference.

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Dear Reader,

For Alaska, the 1980s may best be characterized as a decade of critical policy choices. Our state is regarded by many to be the most promising, albeit largely unexplored, energy storehouse in the nation. Thus, policies guiding the exploration and development of Alaska's energy resources, mostly oil and gas, will continue to be of prominent concern throughout the eighties. And anticipated shortages in the nation's supply of energy sources ensure that national interest will continue to be an important factor in the state's energy development.

The State of Alaska, eager to achieve a measure of long-term economic security, will focus many of its policy debates on the management of its natural resources and oil wealth: how fast should Alaska exploit its nonrenewable resources and how can it convert oil revenues into sustaining sources of economic activity? Alaska Native organizations, multi-national oil companies, labor unions, and national and local environmental organizations—all of which have a direct interest in these policies—will be active participants in these debates.

It is within this context that the Institute of Social and Economic Research (ISER) pursues its primary goals of studying the important issues confronting the state's economy, population, and social and political institutions and informing both public and private decisionmakers and Alaskans in general of our research efforts.

Lee Gorsuch
Director

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ALASKA
REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH, SEPT. 1983, Vol. XX, No. 4

Effects of Oil Revenues on State Aid to Local Governments in Alaska

INTRODUCTION

Before the recent decline in the world price of oil, the State of Alaska had for several years collected ever-larger revenues from oil production at Prudhoe Bay and had passed on hundreds of millions of dollars in increased aid to its local governments. During the early 1980s, when the national recession was creating serious money shortages for many states and their municipalities, Prudhoe Bay oil meant prosperity for Alaska and its city and borough governments.

The biggest increases in state aid occurred between fiscal years 1980 and 1982, when a sharp rise in the price of oil pushed Alaska's petroleum revenues into the billions of dollars. During that brief period, state aid for local operating expenses nearly tripled, state grants for municipal public works projects grew from a few million to nearly half a billion dollars, and the already substantial state aid to Alaska schools increased even further. In all, Alaska's local governments and schools collected more than a billion dollars in state aid in fiscal 1982, as compared with $350 million in 1980.

This fast growth in state aid, coupled with sharp increases in property values in the more populated areas of the state, allowed Alaska's large municipalities to cut property tax rates substantially while expanding services and adding public facilities. In the sparsely-populated rural areas of the state, where tax bases are generally small, more state money allowed communities to offer services and undertake projects they otherwise could not have afforded.

So much state money flowing into local treasuries meant not only that those treasuries became much larger but also that state dollars made up an increasing percentage of local income in recent years. State dollars accounted for a third or more of the general operating revenues of Alaska's boroughs and largest cities during the early 1980s, as compared with about 15 percent in 1976, shortly before the state began collecting Prudhoe Bay oil revenues. Alaska's small rural cities have always relied heavily on federal and state aid, but in the past few years federal aid increased little (and in some cases was reduced) while state dollars multiplied—so that small communities had more money than ever before, and most of it came from the state.

The oil wealth that made possible such substantial increases in state aid to local governments is, however, already waning because of falling oil prices. Alaska's revenues are especially vulnerable to changes in oil prices because the state relies on oil revenues

This *Review* discusses how billion-dollar state oil revenues in the early 1980s made possible huge increases in state aid to Alaska's local governments, and describes how in the past several years municipalities in Alaska came to rely more and more on such state oil money. The *Review* is based on a chapter from *Alaska's Urban and Rural Governments*, by Thomas A. Morehouse, professor of political science with the University of Alaska's Institute of Social and Economic Research (ISER); Gerald A. McBeath, head of the university's Department of Political Science at Fairbanks; and Linda Leask, research associate, also with ISER. The book, a 1982 study of not only the finances but all aspects of local government in Alaska, will be published this winter by University Press of America.

ALASKA REVIEW OF SOCIAL AND ECONOMIC CONDITIONS

VOL. XX, No. 4, September 1983

Published by

Institute of Social and Economic Research
University of Alaska
Anchorage • Fairbanks • Juneau

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E. Lee Gorsuch—Director, Institute of Social and Economic Research

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Anchorage, Alaska 99501

FEATURE

Linda Leask Effects of Oil Revenues on State Aid to Local Governments in Alaska

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much more than do other oil-producing states. In 1982, more than 85 percent of the State of Alaska's general revenues came from taxes on and royalties from Prudhoe Bay oil production. Alaska's fiscal health therefore varies directly with the price of oil. State officials have estimated that each $1 drop in the world oil price costs Alaska $150 million. Oil prices began declining in 1981, and in early 1983 alone dropped several dollars per barrel.

In addition to falling oil prices reducing the state's revenues, production from Alaska's primary revenue source, the Prudhoe Bay oil reservoir, will begin to decline in the mid to late 1980s, further reducing state revenues. So, while it is uncertain just how much oil will sell for in the next few years, it is very unlikely that the state's revenues will again come close to the highs of the past few years.[1]

Less state revenue will mean less money for local governments.[2] In this *Review*, we look at how the state's petroleum wealth translated into prosperity for Alaska local governments during the past several years, but at the same time made them increasingly dependent on a single and volatile source of income. We look first at sources of state and local government income in Alaska before the Prudhoe Bay oil field was developed, and then at how state aid for all Alaska's local governments and school districts increased between fiscal 1976, before the state began collecting oil revenues, and 1982, when those revenues peaked. In the last part of the *Review* we look at the importance of state dollars to Alaska's borough and large city governments and discuss what less state money may mean to Alaska's local governments and school districts in the coming years.

BEFORE PRUDHOE BAY

Until petroleum dollars filled state coffers, state

[1]For a discussion of the factors that have historically influenced oil prices, see "Reflections on the End of the OPEC Era," by Arlon R. Tussing, *Alaska Review of Social and Economic Conditions*, 19,4 (December 1982). An examination of the spending options open to the State of Alaska in the face of declining oil revenues appears in the *Review* of February 1983, "Sustainable Spending Levels from Alaska State Revenues," by Scott Goldsmith.

[2]Another factor that could affect future state aid to local governments is a state spending limit that voters approved in 1982. This limit, which went into effect at the start of fiscal 1984, ties future increases in state spending to increases in state population and costs of living. However, recent analyses indicate that declining oil prices may mean that state revenues will not even reach the designated limit in coming years.

and local governments in Alaska relied heavily on federal money. As recently as 1967, federal dollars made up more than half of the combined revenues of Alaska's state and municipal governments, as compared with 17 percent of revenues for local and state governments nationwide (see Table 1). Alaska depended so much on federal dollars in the early years of statehood because it had no large revenue sources of its own; in fact, many critics of statehood for Alaska had maintained that because of its isolation, small population, harsh climate, high living costs and other factors, Alaska would never develop a strong economic base.

Even in the more populated areas of the state, local tax bases were relatively small in the 1960s and early 1970s. Much of rural Alaska had almost no tax base. Local governments in Alaska looked to the state government to provide services that in other parts of the country were provided in large part by local governments. However, municipal governments in Anchorage and other large urban communities did levy relatively high property taxes for the limited services they provided. The large rural communities in Alaska raised some revenue locally through small property taxes and sales taxes, while some small villages levied sales taxes.

In the mid to late 1970s, construction of the trans-Alaska oil pipeline stimulated economic growth in Alaska. Revenues of Alaska's state and local governments increased, and federal grants came to account for less of total state and local income. By 1980, when the state began collecting very substantial Prudhoe Bay oil revenues, federal grants—while larger than they had ever been before—made up only about 12 percent of the combined revenues of Alaska's state and local governments.[3] At the same time, state and local governments nationwide were relying more rather than less on federal money; in 1980 federal dollars accounted for 22 percent of state and local revenues around the country.

Municipal governments in Anchorage, Fairbanks, Juneau, and other urban areas of Alaska were able to increase services somewhat as their tax bases grew. Growing populations, rising real estate values, and increased economic activity—brought on directly or indirectly by pipeline construction—broadened the tax bases of many local governments in Alaska in the late 1970s.

Then, beginning in 1980, the state government sharply increased aid to local governments, and a new era of local government finances began. Table 2 shows why the State of Alaska could afford to be generous with its local governments in recent years. In 1978, soon after oil began moving through the trans-Alaska pipeline and before the price of oil started a dramatic climb, the State of Alaska's own revenues—excluding federal grants—stood at about $785 million; slightly more than half those revenues were from petroleum. By 1980, when the price of oil was climbing, the state's own general revenues stood at $2.6 billion, with almost 90 percent of that total from petroleum taxes and royalties. The state

[3]Although federal grants in the early 1980s made up a smaller part of state and local revenues in Alaska than in other states, direct federal spending is still very important to Alaska's economy. In 1980, the Department of Defense and other federal agencies supplied one in five jobs in Alaska—three times the national average.

Table 1

Revenue* Sources, State and Local Governments, Alaska and the U.S. Average, Selected Fiscal Years, 1962-1980
(Percent Distribution)

Combined State & Local Govt. Revenues	1962		1967		1974		1977		1980	
	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska	U.S.	Alaska
State Sources	41%	47%	41%	33%	43%	44%	42%	62%	44%	74%
Local Sources	46	19	42	15	37	22	36	17	34	14
Federal Sources	13	34	17	52	20	34	22	21	22	12
All Sources	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

*Includes all revenues except utility revenue, liquor store revenue, and insurance-trust revenue.

Sources: U.S. Department of Commerce, Bureau of the Census, *Census of Governments*, 1962, 1967, and 1977; and *Governmental Finances*, 1973-74 and 1979-80.

took in more than $4 billion in general revenues in 1982.[4]

In short, Prudhoe Bay oil transformed Alaska almost overnight from a state that looked to the federal government for a large share of its modest revenues to a state with billion-dollar revenues of its own.

STATE AID TO LOCAL GOVERNMENTS

The State of Alaska provides three main kinds of aid to local governments: aid for general government operating expenses, grants for public works projects, and aid for schools. (We do not consider various smaller or special state aid programs here.) All boroughs, and first- and second-class cities inside and outside boroughs, can qualify for operating and capital projects aid. Some nonprofit organizations and Native governments can also receive state aid through municipalities. Aid to schools goes to both urban and rural school districts.

It is important to note here that all major state aid programs are paid for through annual legislative appropriations. Regardless of how much aid municipalities may be entitled to under state law, the size of the annual appropriations is at the discretion of the legislature. Although the Alaska Legislature liberalized the laws governing municipal aid programs in the early 1980s, there are already indications that in the face of declining oil revenues the legislature may simply appropriate less than is needed to pay full entitlements under some programs.[5]

Another point to keep in mind is that state money which goes directly to local governments is only part of that spent in Alaska's communities. The state itself still provides some basic services, particularly in rural areas, and undertakes public works projects. Just as oil wealth meant more state aid for municipalities in the past few years, it also meant that the state itself spent more in various ways, particularly for capital projects.

State Aid for Operating Expenses

The two primary state programs that help local governments pay for public services and other operating costs are revenue sharing and municipal assistance.

Table 2

General Fund Revenues,[a] Petroleum and Other, State of Alaska, Selected Fiscal Years, 1970-1983
(in millions of dollars)

Year	Petroleum Revenues[b]	Other Revenues[c]	Total General Revenues	Petroleum Revenues as Percentage of Total
1970[d]	$ 927	$140	$1,067	87%
1972	47	172	219	21
1974	79	176	255	31
1976	386	324	710	54
1978	430	357	787	55
1980	2,254	379	2,633	86
1981	3,299	419	3,718	89
1982	3,574	534	4,108	87
1983[e]	3,048	520	3,568	85
1984[e]	2,477	328	2,805	88

[a]These figures include only unrestricted general fund revenues—that is, revenues the State of Alaska collects from its own sources, exclusive of federal grants, and which can be used for any government purpose. Almost all state revenues go into the general fund; there are a few special funds, all of which are small, except the permanent fund. The permanent fund, established in 1976, had a balance of approximately $3 billion in 1982. State law requires that 25 percent of monies the state currently collects in petroleum royalties and bonuses from petroleum lease sales be automatically deposited in the permanent fund; these mandatory contributions to the permanent fund are not included in the above figures.

[b]Petroleum revenues are largely made up of corporate taxes on petroleum income, severance taxes on petroleum production, royalties from the state's share of Prudhoe Bay oil, and bonuses from petroleum lease sales.

[c]Investment earnings currently make up about half of other revenues; miscellaneous taxes and fees make up most of the balance. Until recently, other revenues also included individual income taxes and gross business receipts taxes; the individual income tax was eliminated in 1980, and the business receipts tax was repealed in 1978.

[d]In fiscal year 1970, the State of Alaska collected more than $900 million from sale of petroleum leases at Prudhoe Bay.

[e]Department of Revenue estimates, subject to change with changes in the price of oil and other factors.

Source: State of Alaska, Department of Revenue, *Revenue Sources*, quarterly.

The revenue-sharing program is administered by the Department of Community and Regional Affairs, and the municipal assistance program by the Department of Revenue. The revenue department also administers a program under which a number of small taxes are shared with the local jurisdictions in which they are collected; this shared tax program has in recent years been dwarfed by the municipal assistance and revenue-sharing programs.

[4]The general revenue figures in Table 2 exclude not only federal grants, but also substantial contributions the State of Alaska has made every year since 1977 to the permanent fund, a special fund established for investment of a portion of Alaska's petroleum revenues. The permanent fund had a balance of $3 billion in late 1982.

[5]See the discussion on p. 9 about 1983 cutbacks in appropriations for school debt reimbursement to city and borough schools.

Between fiscal years 1980 and 1982, state aid under the revenue-sharing, municipal assistance, and shared tax programs increased from $41 million to $150 million; such operating aid had totalled $21 million in 1976 (see Table 3). Looked at another way, the state government paid Alaska's cities and boroughs $51 in operating aid for each resident in 1976, $93 in 1980, and $336 in 1982. If we translate these per capita figures into 1976 dollars (and thus eliminate the effects of price inflation between 1976 and 1982), we find that real per capita operating aid grew modestly between 1976 and 1980, but tripled between 1980 and 1982 (see Table 4).

Revenue Sharing. The state established this program in 1969 to encourage local governments to provide police protection, road maintenance, and other services previously provided by the state throughout much of Alaska. Originally the program paid local governments per capita amounts for providing a number of services and additional money for maintaining roads and operating hospitals.

In 1980, partly in response to criticisms that the existing system unduly favored large municipalities, the state legislature eliminated per capita payments and substituted a formula under which revenue-sharing payments would instead be determined by a municipality's population, tax base, and rate of local taxation.[6] Also, the legislature established for the first time a minimum annual revenue-sharing payment of $25,000 for the smallest municipalities—which under the old system might have qualified for as little as $5,000 annually. The revised revenue-sharing system was intended to distribute state dollars more equitably, because it takes into account a municipality's ability to raise its own revenues.

In fiscal 1976, cities and boroughs in Alaska collected $14 million in state revenue-sharing payments. By fiscal 1980, total state revenue-sharing payments had risen to $27 million. The most dramatic increase in revenue sharing occurred between 1980 and 1981, when payments to communities increased from $27 million to $52 million—a jump of more than 90 percent. In fiscal 1982, state revenue-sharing payments totalled $56 million, and appropriations for fiscal 1983 remained at that level (see Table 3).

Municipal Assistance. This program was created in 1978 and paid for with a portion of the state's corporate petroleum income taxes. Payments under the program are largely based on population.

The municipal assistance fund at first replaced a relatively modest state aid program that was eliminated in 1978 when the business receipts tax was repealed. In fiscal 1980, the second year of the program, Alaska's municipalities collected about $11 mil-

Table 3

Major State Operating Aid to Municipalities[a]
Selected Fiscal Years, 1976-1983
(in millions of dollars)

	1976	1980	1981	1982	1983
Revenue Sharing	$14	$27	$52	$56	$56
Municipal Assist.[b]	–	11	57	87	71[c]
Shared Taxes	7	3	7	7	10
Total	$21	$41	$116	$150	$137

[a]See text for description of these programs.

[b]The state legislature established the municipal assistance program in 1978; this program replaced the much smaller state aid program which had shared business receipts taxes with municipalities.

Sources: State of Alaska, Department of Revenue, municipal assistance spread sheets; Department of Community and Regional Affairs, *Revenue Sharing*, annual reports; and Legislative Finance Division, *Summary of Appropriations*, annual.

Table 4

Per Capita State Operating Aid[a] to Local Governments

	Municipal Population[b]	Total Aid	Per Capita Aid	Per Capita Aid (in 1976 $)[c]
1976	411,495	$21 million	$ 51	$ 51
1980	442,332	41 million	93	68
1982	446,414	$150 million	336	211
1983	459,806	$137 million	298	N/A

[a]Includes state revenue sharing, municipal assistance, and shared taxes.

[b]Population figures as reported by the Alaska Department of Community and Regional Affairs; excludes persons living in unincorporated areas outside organized borough—roughly 5 percent of the state population in 1980.

[c]Figures for 1980 and 1982 deflated by price increases since 1976 as measured by the Anchorage consumer price index.

[6]Although it eliminated per capita payments for services, the legislature retained payments for miles of road and numbers of hospital beds maintained locally; in 1982, state law allowed municipalities to collect $2,500 for each mile of road maintained and $1,000 for each hospital bed.

lion in municipal assistance (see Table 3). But when the price of oil—and thus the state's corporate petroleum taxes—increased sharply between 1979 and 1981, legislative appropriations for municipal assistance mushroomed overnight. Between fiscal 1980 and 1981 alone, municipal assistance payments more than quadrupled, jumping from $11 million to $57 million. The following year, fiscal 1982, the municipal assistance fund stood at $87 million.

The law establishing the municipal assistance program stated that the legislature wanted local governments to use this increased state aid for tax relief, although municipalities were not actually required to reduce their taxes in order to receive municipal assistance. Most boroughs and cities did reduce taxes, some more than others.

Municipal assistance quickly became an important part of local revenues, but a recent change in state tax laws, together with falling state oil revenues, have made the future size of the municipal assistance program uncertain. In 1981, in response to legal challenges to the state's method of measuring taxable petroleum income, the Alaska Legislature changed the state's tax laws, essentially reducing corporate petroleum income taxes and increasing severance taxes. Because the municipal assistance program is paid for with a portion of corporate income taxes, this tax change reduced the legislative appropriation for the program from $87 million in fiscal 1982 to $71 million in fiscal 1983. Municipal officials have asked the legislature for a $25 million supplemental appropriation for the current year and for revisions in the municipal assistance program that would make future appropriations less subject to changes in tax laws.

Shared Taxes. The state government levies a number of taxes that it subsequently shares with local jurisdictions where the taxes are collected. The state currently shares with local governments all or part of taxes it collects on raw fish, utility cooperatives, aviation fuel, liquor licenses, and gaming devices. Before it was repealed in 1978, the gross business receipts tax was the largest of these shared taxes. All together, these shared taxes amounted to about $7 million in 1982 and about $10 million in 1983.

Capital Grants to Municipalities

At the start of the 1980s, the Alaska Legislature established the municipal grants program, under which the legislature awards grants for public works projects directly to local governments. Under this grant system, the receiving government must agree to use the money for specific projects, and to pay operating and maintenance costs of the completed facilities.

Nearly a billion dollars in state grants for municipal public works projects went to Alaska's boroughs and cities in the 3-year period from fiscal 1981 through 1983, with half that total in fiscal 1982 alone (see Table 5). These municipal grants amounted to about $54 for each resident of local jurisdictions in 1980, more than $1,000 per capita in 1982, and about $630 per municipal resident in 1983 (see Table 6).

The State of Alaska's capital budget was less than $100 million annually throughout most of the 1970s, and in some years was made up largely of federal highway grants. There were few state grants for capital projects of borough and city governments in Alaska before fiscal 1980. The larger municipalities financed their capital projects mainly through general obligation bonds; small municipalities usually couldn't afford public works projects. What little state money was available for municipal public works projects was passed through various state agencies rather than appropriated directly to borough and city governments.

Then, when the rising price of oil swelled the state treasury in the early 1980s, the state legislature appropriated increasing amounts for municipal projects and began awarding grants directly to cities

Table 5

State Capital Grants to Municipalities, Selected Fiscal Years, 1974-1983
(in millions of dollars)

	1974	1976	1980	1981	1982	1983
Total Capital Appropriations[a]	$94	$30	$211	$1,043[b]	$1,346	$843[d]
Municipal Grants	N/A[c]	N/A[c]	24[c]	$205	$497	$289[d]
Municipal Grants as a % of Total Appropriations	N/A[c]	N/A[c]	12%[c]	20%	37%	34%

[a]Includes all appropriations in the general appropriations act and any special or supplemental appropriations in any given year.

[b]This total excludes $292 million the State of Alaska paid to Alaska Native corporations under terms of the Alaska Native Claims Settlement Act in fiscal year 1981.

[c]Before fiscal 1980, the state legislature did not make capital appropriations directly to municipalities but rather through various state agencies. Such appropriations through state agencies are difficult to trace, and in any case capital grants to municipalities were small before 1980.

[d]The final figures for fiscal 1983 will probably be higher. The state legislature in early 1983 was considering a $200 million supplemental appropriation, a portion of which will go to municipalities for capital projects.

Source: State of Alaska, Legislative Finance Division, *Summary of Appropriations*, annual.

Table 6

Per Capita State Capital Grants[a] to Local Governments

	Muni. Pop.[b]	Total Aid	Per Capita Aid	Per Capita Aid (in 1976 $)[c]
1976	411,495	—	—	—
1980	442,332	$24 million	$ 54	$ 39
1982	446,414	$497 million	1,113	702
1983	459,806	$289 million	630	N/A

[a]Includes only capital grants awarded to local governments does not include the substantial monies the state itself spends for capital projects in boroughs and cities.

[b]See note b, Table 4.

[c]See note c, Table 4.

and boroughs. In fiscal 1980, the first year under the direct municipal grant system, the state legislature appropriated about $25 million for municipal projects. By the following year, when the state general fund was growing very rapidly, the legislature appropriated more than $200 million—almost ten times more than in the previous year—for local government projects (see Table 5).

State revenues peaked in fiscal 1982. In that year the legislature not only made appropriations for specific municipal projects, it also established a special grants program. Over a period of 2 years, fiscal 1982 and 1983, local governments were to be paid per capita grants to use for capital projects or social services.[7] Unlike other capital grants, which are tied to specific projects, these special grants could be used for projects the municipalities themselves chose. Together, specific project grants and per capita grants totaled nearly half a billion dollars in fiscal 1982.

Municipal grants of $290 million in fiscal 1983[8] were substantially lower than in the previous year, but were still on a scale undreamed of by local officials as recently as 1979. Many municipalities were in fact hard-pressed to deal with these massive increases in public works money, and some of the larger municipalities established special offices to handle these millions of capital grant dollars.

Grants to municipalities accounted for about one-third of the State of Alaska's capital budget from fiscal 1981 through 1983, a period when the state legislature appropriated more than $3 billion for public works projects around Alaska (Table 5).

Combined state operating and capital aid to local governments around the state amounted to more than $1,400 per municipal resident in fiscal 1982, the peak year of state aid, as compared with about $150 per resident in 1980 and $51 in 1976. If we translate all these figures into 1976 dollars, we find that real per capita state operating and capital aid to Alaska's municipalities increased from $51 in 1976 to $107 in 1980 and to about $915 in 1982 (see Tables 4 and 6). Aid for both operating and capital costs declined in fiscal 1983.

Aid to Alaska Schools

The state government pays a substantial share of the costs of building schools in Alaska and most of the costs of operating them. The major kinds of state aid to schools are the school foundation program, which is the central source of operating money for all Alaska schools; state aid for transporting students, for special and vocational education and other special expenses; and state reimbursement of city and borough schools for a large share of the costs they incur in building schools.

Broadly speaking, there are two kinds of school districts in Alaska: (1) districts within boroughs or within first-class or home-rule cities outside boroughs, and (2) districts in areas where there are only second-class cities or unincorporated communities. These latter districts are known as Regional Education Attendance Areas (REAAs).[9]

Roughly 85 percent of public school students in Alaska attend borough and city schools. By far the largest share of these students attend borough schools and a smaller share attend schools in a dozen small city districts in rural areas outside boroughs and in a handful of larger city districts outside boroughs in the more urban areas of the state. The remaining 15 percent of students attend schools in the twenty-one REAAs that cover most of the region outside organized boroughs.

Borough and city school districts pay a portion of the costs of operating their schools; REAAs do not, because historically, rural areas have lacked tax bases. A small part of the operating costs of both

[7]Originally, municipalities were to be paid $1,000 per resident, but in final appropriations, this per capita money was reduced from about $400 million to $295 million, so actual grants were less than $1,000 per person.

[8]The 1983 legislature also approved a $250 million supplemental appropriation for capital projects in fiscal 1983; some portion of this additional money will go to municipalities.

[9]There are also a few schools still operated by the federal Bureau of Indian Affairs in rural Alaska, but these are scheduled to be incorporated into the REAA system by the middle of the decade.

kinds of districts is paid for by federal aid to education. Borough and city districts—particularly the larger districts—typically sell general obligation bonds to pay for building schools, and the state reimburses them for a substantial share of the costs of building new schools. The state itself builds schools in the rural districts.

State operating aid to Alaska's schools increased from about $170 million in fiscal 1976 to $275 million in 1980 and reached nearly $500 million in 1983 (Table 7). This operating aid amounted to an average $1,748 per student of borough and city schools and $2,418 per student of REAAs in 1976; by 1982, per student operating aid in borough and city schools had risen to $3,178 and to $8,724 per student of REAAs. If we discount these figures for price inflation over that 6-year period, we find that real per capita aid to students of borough and city schools increased about 15 percent and per student aid to REAAs more than doubled between 1976 and 1982 (Table 8).

School Foundation Program. This program, administered by the state Department of Education, is the central source of operating money for all Alaska school districts, with payments based on the number of students per district and adjusted for districts with higher living costs. In 1980 the Alaska Legislature made changes in the foundation program that essentially increased state payments to all districts. One of the main changes is that basic foundation payments to city and borough districts are no longer reduced by local contributions. In fact, under the revised system, school districts whose per-student local contribution is below the state average can qualify for additional foundation money.

Table 7 shows that school foundation appropriations increased about 170 percent between 1976 and 1980, and about 90 percent between 1980 and 1983. This large increase occurred because a number of new schools were built during the late 1970s and early 1980s, particularly in rural Alaska, and because the state liberalized its foundation payments. Between fiscal 1981 and 1982 alone, foundation appropriations increased more than 60 percent. The state paid more than $417 million to urban and rural school districts under this program in 1983.[10]

Other Operating Aid. This category of aid to schools includes payments for a number of special operating costs; the largest of these are for student transportation and for special and vocational education programs. The state paid Alaska districts about $15 million for these kinds of costs in 1976. By fiscal 1983, state aid in this category had more than tripled, reaching $66 million (see Table 7).

The various kinds of state aid described above pay almost all the operating costs of schools in the REAAs, with federal money making up the balance. The portion of operating costs that borough and city districts pay through local taxes varies widely, with some districts contributing as much as 35 percent and others as little as 3 percent of the operating revenues of their schools in recent years. In 1981, borough and large city districts paid on average about 24 percent of the operating costs of their schools, with the state paying 73 percent and the federal government the remaining 3 percent.[11] It is likely that in 1982, when the liberalized foundation program payments were fully in effect, the state paid a higher proportion of the operating costs of borough and city schools.

Table 8 shows how overall state operating aid to schools in recent years has translated into aid per student. In general, state operating aid per student is higher in REAAs than in borough and city districts. This discrepancy occurs because costs in rural Alaska are higher than in more urban areas and because the state pays a higher proportion of operating costs in

Table 7

Major State Aid to Alaska Schools,[a] Selected Fiscal Years, 1976-1983
(in millions of dollars)

	1976	1980	1981	1982	1983
School Foundation Prog.	$154	$217	$217	$350	$417[b]
Other Operating Aid	15	59	61	61	66
Total Operating Aid	169	276	278	411	483
Reimbursement for School Construction Debt	9	24	38	38	36
Total	$178	$300	$316	$449	$519[b]

[a]Includes aid to Alaska borough and city school districts and Regional Education Attendance Areas (REAAs). See text for description of these aid programs.

[b]Includes a $25.5 million supplemental appropriation approved by the legislature midway through fiscal 1983.

Sources. State of Alaska, Department of Education, annual reports; Legislative Finance Division, *Summary of Appropriations*, annual.

[10]The original foundation program appropriation for fiscal 1983 was $391.7 million; a supplemental appropriation of $25.5 million midway through the fiscal year brought the total to $417 million.

[11]ISER calculations, based on Department of Education annual reports and municipal financial reports.

Table 8

Average State Operating Aid per Student,[a] Alaska School Districts, Fiscal Years 1976, 1980, 1982

	(in current dollars)			(in 1976 $)[b]		
	1976	1980	1982	1976	1980	1982
City & Boro. Districts.	$1,748	$2,655	$3,178	$1,748	$1,939	$2,005
REAAs	2,418	6,986	8,724	2,418	5,102	5,504
All Districts	1,936	3,259	3,935	1,936	2,380	2,482

[a]As measured by average daily membership figures. During the 1981-82 school year, average daily membership in city and borough schools was 70,683 and in REAAs, 11,181. These figures do not include reimbursement for school construction debt of borough and city schools.

[b]Figures for 1980 and 1982 deflated by price increases as measured by the Anchorage consumer price index; prices recorded by that index increased 36.9 percent between 1976 and 1980, and 58.5 percent between 1976 and 1982.

Sources: Alaska Department of Education, annual reports; and University of Alaska, Center for Northern Educational Research.

the REAAs, which levy no local school taxes. The table shows that in 1976, soon after the REAA system was established, state operating aid amounted to about $2,418 per student in the rural districts and $1,748 per student in the borough and city districts. By 1980, the state paid REAAs $6,986 and borough and city districts $2,655 in operating aid per student. In 1982, when the liberalized foundation program payments were in effect, REAAs collected $8,724 in state aid per student and city and borough districts $3,178 per student; per student payments to REAAs that year were about 175 percent larger than per student payments to city and borough schools.

Part of the increase in per student payments between 1976 and 1982 was due simply to inflation. Table 8 also shows how real (adjusted for inflation) payments changed over that period. With all figures in 1976 dollars, we find that per student state operating aid to REAAs more than doubled during those 6 years, while per student aid to city and borough schools increased about 15 percent.

Reimbursement for School Construction Debt. The State of Alaska builds schools in the REAAs; city and borough districts typically sell general obligation bonds to finance construction of their new schools, and the state reimburses local jurisdictions for most of the bond costs. This aid does not mean that the state takes on the debt obligations of local districts; local governments themselves are still responsible for paying principal and interest on bonds they sell—the state reimbursements are annual appropriations the legislature makes from operating funds.

In the early 1970s, the state reimbursed borough and city districts for half the costs they incurred in financing school construction; this proportion was increased several times during the decade. Table 7 shows that in 1976 the state reimbursed borough and city districts $9 million for school construction debt. In the most recent fiscal years, local governments received more than $35 million annually for costs they had incurred in building schools. This substantial increase resulted from the increased school construction debt of local governments and the increased proportion of that debt paid for by the state in recent years.

In 1982, the Alaska Legislature increased from 80 to 90 percent the amount the state would pay local governments for debt service on school construction bonds sold since 1977. (The legislature had previously agreed to reimburse local governments for 100 percent of bond costs incurred before 1977.) Voters in several urban areas approved sales of millions of dollars in general obligation bonds to finance school construction, in the belief that the state would pay 90 percent of that debt. However, in fiscal 1983 the state legislature appropriated only enough money to cover 63 percent of local school construction debt. A number of boroughs increased property taxes to cover this shortfall. In fiscal 1984 the legislature did agree to reimburse school districts for 90 percent of their school construction debt—but at the same time stipulated that state reimbursement for such debt incurred in the future would be limited to 50 percent.

This move to limit state aid for local school construction costs may be a harbinger of things to come in other kinds of state aid to local governments.

Summary of Changes

Table 9 summarizes the overall changes in the three major categories of state aid to local jurisdictions in Alaska between fiscal years 1976 and 1983. The broad changes were:

1. State aid for local operating costs, capital projects, and schools tripled between fiscal years 1980 and 1982, growing from $364 million to more than a billion dollars. To put this number in perspective, recall that in 1976 the State of Alaska's entire income—from its own sources and from federal revenues combined—was less than $1 billion.

2. State grants for municipal public works projects, which were almost nonexistent before 1980, mushroomed in the three most recent years, totalling more than $900 million.

3. In 1976, 90 percent of major state aid to municipalities was for schools; in the three most recent years, with very rapid growth in state aid for general government operating and capital costs, aid for schools made up only about half of state aid to local jurisdictions.

4. The proportion of state general revenues devoted to local government and school costs roughly doubled between 1980 and 1982. In 1980, state aid to municipalities and school districts accounted for about 14 percent of the state's general revenues. By 1982, rapid growth in state aid—particularly in aid for public works projects—meant that about 27 percent of state general revenues went to local jurisdictions. It is interesting that—as Table 9 shows—in 1976, when state revenues were much smaller, roughly the same percentage of those revenues went to local jurisdictions as in 1982; in 1976, however, almost all state aid was for schools.

CHANGES IN LOCAL GOVERNMENT

Up to this point, we have shown how state money for various kinds of municipal aid increased as the state's petroleum revenues grew. In this section, we look at some of the effects on Alaska's local governments of petroleum development over the past decade, and of increased state aid in the past several years.

Table 9

Major State Aid to Alaska Schools and Local Governments, Selected Fiscal Years, 1976-1983
(in millions of dollars)

	1976	1980	1981	1982	1983
Aid to Alaska Schools[a]	$178	$299	$315	$ 449	$520
Aid to Local Govts.					
Operating Aid[b]	22	41	116	150	137
Capital Grants	N/A	24	205	497	289
Total Aid to Schools & Local Governments	$200	$364	$636	$1,096	$946
Aid to Schools & Local Govts, as % of State General Revenues[c]	28%	14%	17%	27%	28%

[a]See Table 6 for categories of state aid to schools.

[b]See Table 4 for major state aid programs for local governments.

[c]See Table 3 for general fund revenue figures.

Sources: State of Alaska, Legislative Finance Division, *Summary of Appropriations*, annual; Department of Revenue, SB168 community grants logs, 1982 and 1983; and Department of Revenue, *Revenue Sources*, quarterly.

Growing Tax Bases

Alaska's population increased about 45 percent between 1970 and 1982, with most of that growth concentrated in Anchorage and other urban areas of southcentral, interior, and southeast Alaska. About eight out of ten of the approximately 450,000 Alaskans live in the state's eleven organized boroughs and in a handful of urban communities outside boroughs. These larger municipalities have historically paid a substantial share of local government costs through property and other taxes. (The remaining 15 to 20 percent of Alaskans live in small, rural municipalities or in unincorporated areas that rely primarily on state and federal aid.)

Growing populations, rising real estate values, and increased economic activity brought on directly or indirectly by petroleum development broadened tax bases in urban Alaska in recent years. Construction of the trans-Alaska pipeline created an economic boom in the mid-1970s, and state spending of large petroleum revenues has fueled economic growth in the early 1980s.

Table 10 shows growth in assessed value of property in Alaska's boroughs from 1976 through 1982. The smallest increase in property value in any borough during that period was 97 percent in the Haines Borough, and the greatest increase was 360 percent in the North Slope Borough, where the Prudhoe Bay oil field and related facilities are located. Among other boroughs, property values commonly increased 150 percent or more over those 6 years.

A significant share of the increase in property values was due simply to price inflation during that period. However, if we deflate these figures to take inflation into account, we see that the real increases in property values in most boroughs (column five of Table 10) were still substantial. Real increases (as measured in 1976 dollars) of between 50 and 100 percent in the value of assessed property were common to most boroughs between 1976 and 1982.

Increased Employment

Figure 1 provides a good measure of municipal government growth in Alaska during the era of petroleum development, by comparing increases in numbers of local, state, and federal government employees between 1970 and 1982. During that period, when the state population increased about 45 percent, local government (including school district) employment nearly tripled, state employment grew about 80 percent, and federal employment changed little.

In 1970, local governments and school districts in Alaska employed about 8,000 persons, as com-

Table 10

Property Valuation,[a] Alaska Boroughs, 1976, 1981, 1982
(in millions of dollars)

	1976	1981	1982	Percent Increase 1976-1982	Real[b] Percent Increase 1976-1982
			Unified and Home-Rule Boroughs		
Municipality of Anchorage	$3,740	$8,003	$10,612	+184%	+79%
City & Borough of Juneau	326	859	1,038	+218	+100
City & Borough of Sitka	151	382	421	+178	+76
North Slope Borough	1,794	6,705	8,269	+361	+191
			Second- and Third-Class Boroughs		
Bristol Bay Borough	$ 26	$ 85	$ 88	+238%	+113%
Fairbanks North Star Borough	1,237	2,607	2,996	+142	+53
Kenai Peninsula Borough	909	2,582	2,978	+228	+106
Ketchikan Gateway Borough	245	545	667	+172	+72
Kodiak Island Borough	146	378	438	+200	+89
Matanuska-Susitna Borough	453	1,123	1,203	+166	+67
Haines Borough	36	64	71	+97	+25

[a]Full value determination, including oil and gas property, as reported by the state assessor.

[b]Deflated by the increase in the Anchorage Consumer Price Index from 1976 through 1982; during that period, prices recorded by the index increased 58.5 percent.

Source: State of Alaska, Department of Community and Regional Affairs, *Alaska Taxable*, 1976, 1981, 1982.

pared with 10,000 state and 17,000 federal civilian workers. Ten years later, in 1980, nearly 21,000 Alaskans worked for municipal governments and school districts, as compared with about 15,500 state employees and about 18,000 federal workers.

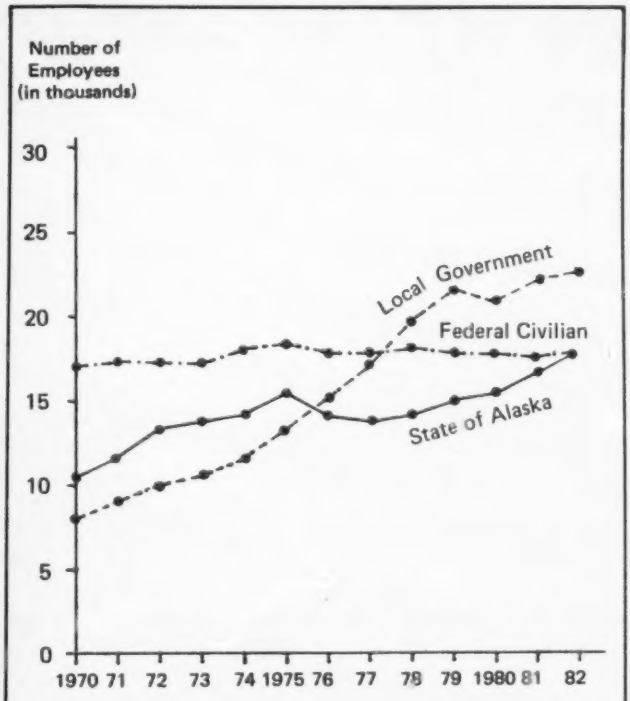
The sharp increase in local government employment in urban Alaska in the last half of the 1970s was due to the larger populations and tax bases able to support larger government organizations. In rural Alaska such increases in government employment were primarily due to creation of the REAAs—large, locally-controlled rural school districts. Establishment of these REAAs meant not only transfer from state to local employment of persons who had formerly worked for the state-operated rural school system (which the REAAs replaced) but also the addition of many new employees to staff the substantial number of new schools built in rural Alaska since 1976.

After 1980, large infusions of state money for both urban and rural areas helped boost local government employment even further. Between 1980 and 1982, local government employment jumped from 21,000 to 23,000. During the same brief period, state employment grew about 15 percent, increasing from 15,500 to 18,000, while federal employment remained at about 18,000, the level where it had been for the past decade. (These figures show why federal employment is still so important in Alaska, even though the number of federal jobs increased little in recent years: it is a stable source of a large number of jobs, which are largely unaffected by the historic ups and downs of Alaska's economy.)

Increased Services

Another measure of growth in local government in Alaska is the level of government services now provided locally: local governments, particularly boroughs, are providing substantially more services now than they did in the early 1970s.

In most of Alaska's boroughs, few services except education are provided throughout the entire borough. Rather, most services, such as road maintenance, police and fire protection, and water and sewer systems, are provided only to limited service areas,



Source: ISER, Man-in-the-Arctic Program.

Figure 1. Government Employment in Alaska, 1970-1982

where residents have approved establishment of the services and have voted to pay for them (at least partially) through local taxes. (In boroughs where separate city governments also exist, cities can be in effect service areas, providing certain services only to those living within city boundaries.)

Therefore, growth in the number of borough service areas and expansion of services in existing service areas are measures of growth in local government. Between 1976 and 1982, the overall number of service areas in Alaska's organized boroughs increased from 55 to 145—a jump of about 170 percent. Most of this increase occurred in the Fairbanks, Mat-Su, Kenai Peninsula, and Anchorage boroughs. Growth in borough service areas had already begun in the late 1970s, but increased state money after 1980 intensified the trend. Services most commonly established in the new service areas were road maintenance and fire protection—costs of which the state has heavily subsidized in recent years.

More and improved services have also been provided in existing cities and service areas in recent years. The Municipality of Anchorage, for example, has extended police and fire protection, the public bus system, and water and sewer systems to more areas of the municipality in the past several years. Other boroughs have added or expanded public landfills, libraries, and emergency medical services. And the North Slope Borough, Alaska's most recently established borough, has undertaken a massive capital improvements program to provide public safety, sanitation and utility systems, roads, and other basic services in all borough villages. (See discussion below of the North Slope Borough.)

Municipal Debt

Another measure of local government growth over the past decade is growth in general obligation debt of municipalities. Municipalities incur such debt by selling general obligation bonds to finance construction of public facilities. As Table 11 shows, bonded debt of Alaska's cities and boroughs grew rapidly between 1970 and 1982, increasing from $149 million to $1.3 billion. This amounted to an 800-percent increase over 12 years, or an annual average increase of about 20 percent. However, a large share of the increase in municipal debt over the past few years is attributable to just one municipality—the North Slope Borough, whose bonded debt grew from $26 million in 1976 to nearly $600 million in mid 1982 and nearly $1 billion by early 1983. In 1982, the North Slope Borough's debt alone ac-

Table 11

Bonded Debt,[a] Alaska Municipalities, Selected Years, 1970-1982
(in millions of dollars)

	All Cities & Boroughs	North Slope Borough	North Slope Debt as % of Total Municipalities
1970	$ 149	–	–
1972	262	–	–
1976	420	$ 26	6%
1980	827	257	31
1981	1,091	487	45
1982[b]	1,316	587	45
1983	N/A	987	N/A

[a]General obligation bonded debt.

[b]As of July 1982.

Source: Alaska Department of Community and Regional Affairs, *Alaska Taxable*, annual.

Table 12

Borough[a] General Revenues[b] by Source, Fiscal Years 1976 and 1981

	1976 (in thousands of dollars)	1976 (Percentage)	1981 (in thousands of dollars)	1981 (Percentage)
Local				
Taxes	$93,191	71%	$108,567	42%
Other	8,024	6	64,855	25
Total	$101,215	77%	$173,422	67%
State	21,110	16	71,318	27
Federal	8,844	7	15,635	6
Total	$131,169	100%	$260,375	100%

[a]This table shows aggregate borough general revenues for all Alaska boroughs except the North Slope Borough; revenues for that borough are shown separately in Table 8A.

[b]To make general revenues consistent among borough governments, we have included the following local sources: taxes levied for general government purposes; interest income from investments; charges for services and other local fees. State and federal sources include all revenues for general government operations. Included in federal sources is federal revenue sharing, which is sometimes classified as special revenue but which can be used for a variety of government purposes. Not included here are special and enterprise revenues, revenues for capital projects, and federal and state aid for education.

Source: Alaska borough governments, annual financial reports, fiscal years 1976 and 1981.

counted for 45 percent of all municipal debt in Alaska. We do not have 1983 figures for all cities and boroughs, but the borough's proportion of total municipal debt will undoubtedly be higher this year, since it now owes nearly $1 billion.

If we eliminate the large debt of the North Slope Borough, we find that debt of other cities and boroughs increased about 400 percent, or slightly more than 12 percent on an annual average, between 1970 and 1982. Much of this debt among boroughs other than the North Slope is for school construction, but over the past decade, cities and boroughs also took on some debt for roads, fire and police buildings, water and sewer systems, libraries, hospitals, airports, and parks and recreation facilities.

An interesting aspect of the municipal debt figures for the most recent years is that, excluding debt of the North Slope Borough, municipal debt increased modestly between 1980 and 1982, when hundreds of public works projects of all descriptions were underway in localities around the state. This occurred because almost all municipal projects were being financed entirely or in large part with state money. As Table 5 shows, municipal grants totalling nearly $1 billion went to municipalities around the state from fiscal 1980 through 1983. Most general obligation debt that municipalities did incur in the early 1980s was for school construction.

General Revenues of Boroughs and Large Cities

Yet another indication of growth and change among local governments is change in amounts and sources of municipal income.

Tables 12 and 13 show general revenues by source for boroughs and for large cities inside and outside boroughs in 1976 and 1981. Excluded from these tables are the revenues of the North Slope Borough and the City of Valdez, which are shown separately in Tables 14 and 15. The North Slope Borough and Valdez represent special cases in Alaska, in that they have benefited from petroleum develop-

Table 13

General Revenues[a] of Selected Home-Rule and First-Class Cities,[b] by Source, Fiscal Years 1976 and 1981

	1976 (in thousands of dollars)	1976 (Percentage)	1981 (in thousands of dollars)	1981 (Percentage)
Local				
Taxes	$11,679	51%	$15,012	33%
Other	4,248	19	9,632	21
Total	$15,927	70%	$24,644	54%
State	4,529	20	18,550	40
Federal	2,140	10	2,684	6
Total	$22,596	100%	$45,878	100%

[a]See note b, Table 12.

[b]Cordova, Fairbanks, Homer, Kenai, Ketchikan, Kodiak, North Pole, Palmer, Petersburg, Soldotna, Seward, Wasilla, Wrangell. General revenues of Valdez are excluded here and shown in Table 9A.

Sources: Alaska city governments, annual financial reports, fiscal years 1976 and 1981.

ment more through their own taxes than through state aid. So we look first at broad changes in revenues among other boroughs and cities, and then specifically at the North Slope Borough and Valdez.

Overall, general revenues of Alaska's boroughs and large cities (excluding the North Slope Borough and Valdez) roughly doubled between 1976 and 1981, with some sources of revenues growing modestly and others very quickly. The two fastest-growing revenue sources were state aid (as we would expect) and local sources other than taxes— which include interest income from investments and charges for services. Tax collections and federal aid increased relatively little between 1976 and 1981.

Because of these different rates of growth in revenue sources, state aid had become twice as important a source of municipal revenues by 1981 than it had been in 1976, while local taxes by 1981 made up a much smaller share of overall revenues. State dollars in 1976 made up about 16 percent of borough general revenues and 20 percent of revenues of large cities; by 1981, state aid accounted for 27 percent of borough and 40 percent of city revenues. By contrast, local taxes, which had made up 70 percent of borough revenues and more than half of city revenues in 1976, accounted for only 42 percent of borough and 33 percent of city revenues by 1981.

Local non-tax revenues were a much more significant source of borough and city revenues in 1981 than in 1976; such non-tax revenues accounted for 25 percent of borough revenues in 1981, as compared with only 6 percent 5 years earlier. A large share of this non-tax revenue in 1981 was interest income on municipal investments; high interest rates in 1981 boosted returns on municipal investments far higher than they had been in previous years.

Federal aid as a proportion of overall borough and city general revenues declined slightly between 1976 and 1981, even though actual dollars of federal aid increased over that period. The moderate growth in federal aid was far outpaced by growth in state aid; in 1981, federal aid accounted for about 6 percent of general revenues of boroughs and large cities.[12]

Overall, the burden of financing Alaska's growing borough and city governments fell less on local taxpayers and more on state government in recent years. Although we do not have 1982 financial reports from all municipalities as of this writing, it is very likely that state dollars made up an even larger proportion of municipal revenues in 1982 than in 1981, since state operating aid was much higher in 1982. In Anchorage, for example, where half of all Alaskans live, state aid in 1982 made up 42 percent of general government revenues.

Table 14

North Slope Borough General Revenues,* by Source, Fiscal Years 1976 and 1981

	1976		1981	
	(in thousands of dollars)	(Percentage)	(in thousands of dollars)	(Percentage)
Local				
Taxes	$7,387	60%	$62,776	76%
Other	2,541	21	24,747	27
Total	$9,928	81%	$87,523	92%
State	2,208	18	5,407	5
Federal	97	1	222	1
Total	$12,233	100%	$93,153	100%

*See note b, Table 12.

Source: North Slope Borough, annual financial reports, fiscal years 1976 and 1981.

Table 15

General Revenues* of the City of Valdez, by Source, Fiscal Years 1976 and 1981

	1976		1981	
	(in thousands of dollars)	(Percentage)	(in thousands of dollars)	(Percentage)
Local				
Taxes	$6,554	77%	$10,824	56%
Other	880	10	5,669	29
Total	$7,434	87	$16,493	85
State	1,055	12%	2,724	14%
Federal	29	1	156	1
Total	$8,518	100%	$19,373	100%

*See note b, Table 12.

Source: City of Valdez, annual financial reports, fiscal years 1976 and 1981.

[12] By comparison, state dollars nationwide accounted for about 16 percent of the 1981 general revenues of cities. Taxes made up more than half of the average American city's general revenues in 1981, and other local sources, including charges for services and interest income, accounted for another 21 percent. Federal dollars made up 9 percent of cities' general revenues that year.

North Slope Borough and Valdez Revenues

Oil and gas property in the City of Valdez, site of the oil pipeline terminal, was valued at about $1.7 billion in 1982. Petroleum property in the North Slope Borough, which includes the Prudhoe Bay oil field and related facilities, was valued at about $8.3 billion that year. Valdez has a population of about 3,300, and the North Slope Borough has a permanent population of about 4,500 in eight villages and a transient population of several thousand Prudhoe Bay workers. (The magnitude of these tax bases becomes clearer if we note that all property in Anchorage, where more than 200,000 Alaskans live, was valued at about $10.6 billion in 1982.)

Tables 14 and 15 show what valuable petroleum property means to these two municipalities. Valdez took in about $10 million in property taxes for general expenses in 1981, which accounted for 56 percent of the city's general revenues. Other local sources—chiefly interest income on investments—netted the city an additional $5.6 million that year. Together, taxes and other local sources made up about 85 percent of Valdez's general revenues in 1981. State aid of about $2.7 million accounted for 14 percent of the city's general revenues; in other large cities that year, state aid made up about 40 percent of general revenues. This is not to say that Valdez got relatively less state aid than other cities, but rather that Valdez's own sources of income were larger in proportion to state aid.

In the North Slope Borough, property and other taxes increased from just over $7 million in 1976 to $63 million in 1981, with almost all these taxes paid by oil companies operating at Prudhoe Bay. Other local sources of revenue—primarily interest income on investments—brought the borough an additional $24 million in 1981. State aid (of about $5.5 million) made up 5 percent of the North Slope Borough's general revenues that year, while it made up about 27 percent of revenues among other boroughs.

In the current fiscal year, the North Slope Borough will take in approximately $138 million in property taxes. (By comparison, the Municipality of Anchorage will take in $87 million in property taxes for general government and school costs in 1983.) As shown in Table 16, the North Slope Borough's property tax rate of 16.4 mills was the highest among Alaska boroughs in 1982. About two-thirds of the borough's fast-rising tax collections in recent years have been for debt service on its general obligation bonds.

The borough's debt service payments are large because by mid-1983 it had sold nearly $1 billion in general obligation bonds to finance a capital improvements program underway in the borough's villages. (The State of Alaska restricts local government taxation of petroleum property, but these restrictions do not apply to taxes collected for payment of debt service on general obligation bonds.) As Table 11 shows, the North Slope Borough carries a large share of all municipal debt in Alaska.

Tax Rates

Table 16 shows what growing tax bases and increased state aid meant to local taxpayers in the early 1980s: dropping property taxes.

Property taxes in a number of Alaska's boroughs and large cities were high in 1976. In the former City of Anchorage—now part of the unified Municipality of Anchorage—residents paid taxes of more than 20 mills. (One mill equals $1 in taxes for each $1,000 of assessed value of property.) In other cities within boroughs—or former cities in unified municipalities—property owners commonly paid 15 or more mills. Between 1976 and 1979, growing tax bases allowed a number of local governments to cut their tax rates. For example, in 1976 residents of the City of Kenai in the Kenai Peninsula Borough paid a rate of 21 mills; by 1979 that rate had dropped to 15 mills.

Then, between 1979 and 1982, the state legislature appropriated many millions of dollars in increased aid for local operating expenses and urged municipal officials to use this extra state money to reduce taxes. More state dollars allowed almost all boroughs and cities within boroughs to cut tax rates significantly. The biggest tax cuts in many boroughs were made between 1980 and 1981; a few boroughs and cities cut tax rates more than 50 percent just between those years. Boroughs that cut their tax rates most in 1981 include the Fairbanks North Star Borough, the Kenai Peninsula Borough, and the Ketchikan Gateway Borough.

It was common for 1982 tax rates in boroughs to be 30 to 40 percent lower than they had been before the state began massively increasing aid payments to municipalities. The exception was the North Slope Borough, as discussed in the preceding section, where the mill rate increased more than 50 percent in recent years.

At the same time that tax rates were going down in most boroughs, the value of property was, as shown in Table 10, increasing rapidly. As an illustration of what this combination of reduced tax rates and increased property value meant to individual taxpayers in recent years, the Municipality of Anchorage [13] calculated this example: Given the average

[13] Municipality of Anchorage, budget office, 1982.

Table 16

Property Tax Rates, Alaska Boroughs, Selected Years, 1976-1982
(in mills)

	1976	1979	1980	1981	1982
			Unified and Home-Rule Boroughs		
Municipality of Anchorage					
Former City of Anchorage	20.44	13.79	12.06	8.30	7.18
Outside Service Areas[a]	12.02	8.87	7.29	3.76	3.24
City and Borough of Juneau					
Former City of Juneau	15.36	12.95	12.83	7.74	11.87
Outside Service Areas[a]	14.08	10.36	9.82	3.23	8.07
City and Borough of Sitka	5.00	3.50	3.50	3.00	3.00
North Slope Borough	10.30	10.35	10.35	16.70	16.42
			Second- and Third-Class Boroughs		
Bristol Bay Borough	14.00	9.00	7.50	6.50	5.00
Fairbanks North Star Borough					
City of Fairbanks[b]	16.30	15.68	13.70	6.00	6.90
Outside Service Areas[a]	6.30	7.18	6.20	5.50	6.40
Kenai Peninsula Borough					
City of Kenai[b]	21.20	15.00	12.80	4.70	3.93
Outside Service Areas[a]	5.00	2.50	2.50	1.75	1.25
Ketchikan Gateway Borough					
City of Ketchikan[b]	21.40	16.00	15.10	5.90	5.80
Outside Service Areas[a]	9.60	4.50	2.50	1.00	1.00
Kodiak Island Borough					
City of Kodiak[b]	16.33	12.18	12.98	7.50	9.00
Outside Service Areas[a]	7.23	6.18	6.98	5.50	5.00
Mat-Su Borough					
City of Palmer[b]	13.00	12.20	13.40	10.70	8.90
Outside Service Areas[a]	8.00	7.40	8.95	7.22	5.40
Haines Borough[c]					
City of Haines[b]	15.33	8.20	10.50	8.50	8.00
Outside Service Areas	7.60	2.00	1.00	1.00	2.00

[a]"Outside service areas" means areas within boroughs that receive only the areawide borough services (education being the primary areawide service in all boroughs); because residents of such areas receive fewer services than do residents of cities or service areas, they pay lower property taxes.

[b]For first-class cities within second- and third-class boroughs, these tax rates are combined city and borough taxes.

[c]The Haines Borough is the only third-class borough in Alaska.

Source: Alaska Department of Community and Regional Affairs, *Alaska Taxable*, annual.

annual increase in value of existing property in Anchorage, a house that was worth $88,500 in 1979 would have been worth $116,700 by 1982. At the existing mill rate of 13.79 in the Anchorage bowl area in 1979, the owner of that house assessed at $88,500 would have paid $1,220 in property taxes. By 1982, with his house now valued at $116,700 but the mill rate reduced to 7.18, the owner's tax bill was $838—or $380 less than it had been in 1979, even though the property was worth substantially more.

In 1983, however, the brief era of very low property taxes is ending. As discussed further in the concluding section, cutbacks in state aid for municipal school construction debt, and in the municipal assistance program, have already started pushing property taxes back up in a number of large municipalities.

SUMMARY AND CONCLUSIONS

Overall then, Alaska's municipalities hired scores of employees, added new services, built hundreds of public facilities, and cut their tax rates on the strength of state oil revenues that are now waning. As soon as the State of Alaska's petroleum income dropped from its peak in 1982, local governments felt the effects of the fall.

With less money to spend, the legislature began searching for ways to reduce the various state aid programs for schools. The legislature initially appropriated $392 million for the school foundation program for fiscal 1983, which was about $25 million short of the amount local officials had calculated they were entitled to under the foundation formula. Municipal officials succeeded in getting that extra $25 million for 1983 in a supplemental appropriation, but proposed school foundation funding for the upcoming school year varies from about $415 million to $430 million—both substantially short of the roughly $448 million school officials have asked for. If the final appropriation does fall millions of dollars short of what cities and boroughs expect to receive, urban districts will have to either reduce costs or require local taxpayers to make up the difference. Residents of REAAs (large, rural school districts) pay no local taxes, so those districts presumably would have to adjust to less money.

The legislature also moved to hold down school aid by cutting back reimbursement of boroughs and cities for debt service on school construction bonds. In fiscal 1983, the legislature appropriated enough to repay municipalities for about 63 percent of their school construction debt, as compared with the 90 percent reimbursement allowed under state law. Several boroughs sold millions of dollars in general obligation bonds for school construction, in the expectation that the state would pick up 90 percent of the costs. Some municipalities raised their 1983 property tax rates to make up for this shortfall.

While municipalities can (at least in theory) adjust to less state operating money for schools by reducing operating costs (and thus avoid raising property taxes), they cannot reduce the general obligation debt they have incurred in building schools. That debt is a legal responsibility of the municipalities, .

The legislature did agree to reimburse school districts for 90 percent of their construction debt in fiscal 1984, but at the same time voted to restrict state reimbursement for school debt incurred in the future to 50 percent.

Reduced state money for education has already revived an old controversy that had lain dormant during the years when state money flowed freely: the debate over the state's policy of paying all costs of building and operating schools in rural districts, while requiring city and borough districts to pay a portion of construction and operating costs. The state's historic rationale for this policy has been that urban areas with larger populations and bigger tax bases could afford to pay some of the costs of their schools, while rural villages with very small tax bases could not. Some urban officials have maintained that REAAs should be required to pay a portion of school costs, or, conversely, that the state should pay all costs of both urban and rural schools.

One borough has filed suit against the state, charging that the state has no consistent policy for providing comparable aid for education statewide.

It seems very unlikely that in the face of falling revenues the state will agree to assume even more school costs than it already bears. What does seem probable is that the state will continue to look for ways of holding down its education costs—not only by shifting increased costs to urban taxpayers, but also by examining ways of reducing rural school costs.

State aid for general government expenses of municipalities also appears to be in decline. The fiscal 1983 appropriation for the municipal assistance program was about $71 million, as compared with $87 million the previous year. It was primarily this program—together with the older state revenue-sharing program—that allowed local governments to cut their property taxes so sharply in 1980 and 1981. Municipal officials have asked for an additional $25 million in operating aid for this year, but to date the legislature has not approved the extra money and has proposed to fund municipal assistance at around $71

million again in fiscal 1984. In any case, legislators have made it clear that since the state itself has less money, local governments can expect to get less state money in the coming years. The 1983 drop in the municipal assistance program has already translated into a mill rate increase in Anchorage and some other communities.

Some Alaskans are worried that the windfall in state aid during the early 1980s pushed local spending beyond what urban areas can reasonably support or the state itself can maintain in rural areas. One way to tell if local government spending in urban areas has grown out of proportion to the tax base would be to determine what local taxes would have been in 1983 if tax collections had grown at the same rate as local spending in recent years. We do not have complete budget and tax collection figures for all large municipalities through 1983, but Figure 2 provides such figures for Anchorage, where half of all Alaskans live.

The figure shows growth in general government spending (including the local appropriation for schools) and tax collections in Anchorage from 1976 through 1983, and also what tax collections would have looked like since 1980, if tax collections had grown at the rate of spending (and thus maintained their historic relationship to spending).

From 1976 through 1979, tax collections and general fund expenses in Anchorage grew at about the same rate, with taxes paying roughly 70 percent of general government costs. During that period, the city's tax base grew substantially, so the municipality was able to reduce tax rates (Table 16) while at the same time increasing overall tax collections.

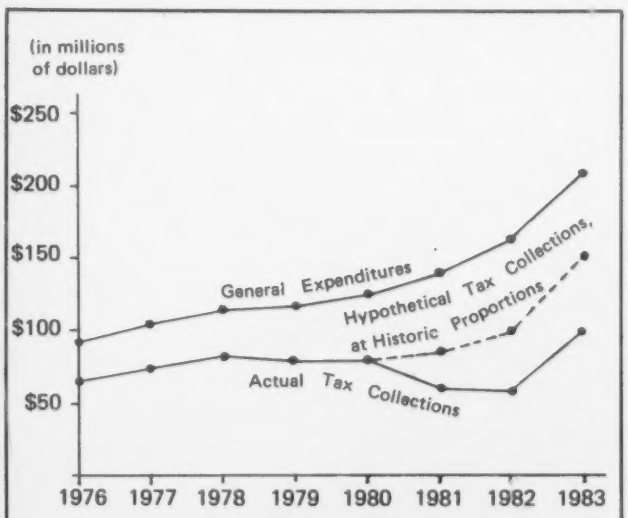


Figure 2. General Fund Expenditures* and Tax Collections, Municipality of Anchorage, 1976-1983

*Includes spending for general government functions, and the appropriation for school operating costs.

In 1980, when the municipality began receiving more state money, spending climbed and taxes dropped. By 1982, when mill rates and overall property tax collections were at their lowest, taxes paid for about 36 percent of Anchorage's general expenses. In 1983, taxes increased for the first time since 1979; the municipality expects to take in $87 million in taxes this year, as compared with about $59 million in 1982. With Anchorage's tax base now at about $10 billion, property owners will pay between 5 and 9 mills in various parts of the municipality this year, as compared with approximately 3 to 7 mills in 1982.

If, however, taxes still paid for 70 percent of general spending—as they did before the jump in state aid in 1980—the municipality would have to take in $147 million in taxes this year, or 80 percent more than the $87 million it actually plans to collect. An 80 percent increase in taxes would mean Anchorage's property owners would pay between 9 and 16 mills. These hypothetical mill rates would be slightly higher than 1979 rates, which varied from less than 9 mills to almost 14 mills.

Figure 2 tells us that the Anchorage tax base could in fact support the current level of spending—even if state aid were reduced to its pre-1980 level. But taxes would be as high or higher than they were in 1979. So, property tax reductions in Anchorage in the early 1980s were due largely to increases in state aid.

In the years beyond 1983, however, Anchorage and other communities will face not only declining state aid but also added costs of operating and maintaining new public facilities. Many of the public works projects the state is paying for are not yet complete—but when they are, it is the municipalities and not the state that will pay to operate and maintain them. As state aid declines, the added local costs of maintaining current programs and paying for new public facilities could push property taxes beyond their historic levels.

Municipal officials we interviewed in a number of urban areas in 1982 said that local governments would hold property taxes to a reasonable level—although certainly not at their current low levels—by curbing spending, imposing user fees for new public facilities, and broadening their tax bases through development of nonpetroleum industries.

However, even as state oil revenues shrink, state aid for education and other costs will continue to be an important source of local government revenues

in urban Alaska, and rural municipalities with small tax bases will continue to look to the state for most of their revenues. The State of Alaska now faces the difficult job of managing its still-substantial—although diminishing—oil wealth to secure Alaska's economic health in the decades beyond the 1980s. To a large extent, the fortunes of Alaska's local governments are also riding on the state's success in converting its temporary oil wealth to a long-term source of income.

* * * *

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